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TWENTY-SEVENTH ANNUAL REPORT

OF

THE LOCAL GOVERNMENT BOARD,

1897–98.

SUPPLEMENT

CONTAINING THE

REPORT OF THE MEDICAL OFFICER

For 1897–98.

Presented to both Houses of Parliament by Command of Her Majesty.

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REPORT.

TO THE RIGHT HONOURABLE HENRY CHAPLIN, M.P.,
PRESIDENT OF THE LOCAL GOVERNMENT BOARD.

SIR,

I HEREWITH beg leave to submit to you, for presentation to Parliament, my annual report on the proceedings of the Medical Department for the year 1897-98.

In a special report on the Inland Sanitary Survey of England and Wales of 1893-95,* undertaken in connexion with threatened invasion of this country by cholera, which I had the honour of laying before you in November, 1897, I took occasion to refer to the great loss which the Department had sustained by the death of Dr. Barry, the Board's Senior Medical Inspector. To that office you promoted Dr. Bruce Low, and the vacancy thus arising on the permanent medical staff was filled by you by the appointment of Dr. Frederick St. George Mivart, who for some two years had performed excellent work as a temporary Medical Inspector.

I.—Administrative Relations of the Medical Department.

1. VACCINATION AND PUBLIC VACCINATION.

The digest of the Vaccination Officers' returns contained in Appendix A, No. 1, is concerned with births during the calendar year 1895; the most recent period for which final information, based on repeated local inquiries concerning each child, is procurable. It shows that after deducting from a total of 921,512 births, those children who were successfully vaccinated, those who died unvaccinated, those who were registered as "insusceptible" of vaccination, and those who had small-pox before vaccination, there still remained 20·5 per cent. who could not be traced or were otherwise not finally accounted for as regards vaccination. The proportion unaccounted for in the Metropolis was 24·9 per cent., that for the rest of England was 19·8; both of which rates show a still further increase on a failure to comply with the provisions of the Vaccination Acts which has been steadily growing for some fifteen years. Indeed, if allowance be made for the further falling off in this respect which is believed to have occurred since 1895, the number of children now born in England and Wales who in one way or another escape vaccination, is probably not much less than one-third of the whole. In this way the country is being prepared for widespread epidemics of small-pox such as have been unknown to

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*** Supplement by the Medical Officer to the 24th Annual Report of the Local Government Board. Inland Sanitary Survey, 1893–95. [C.—8215], 1896.**

the present generation; unless, indeed, the invariable rush and clamour for immediate vaccination on the part of those who have neglected or declaimed against the operation during times of freedom from small-pox, should be capable of being so far met in the moment of emergency as largely to mitigate the impending disaster.

INSUSCEPTIBILITY.

It will be observed from the returns for 1895 that 2,962 children were registered as insusceptible of vaccination. In this connexion I would point out that the number of consecutive primary vaccinations by the Board's own officers without the occurrence of a single instance of so-called insusceptibility, now reaches 107,180.

INSPECTION OF PUBLIC VACCINATION.

During 1897, 1,553 vaccination districts were visited by Medical Inspectors, and the Public Vaccinators of 1,136 were recommended for award on account of the efficient performance of their duties. (App. A., No. 2.)

NATIONAL VACCINE ESTABLISHMENT.

In the same period, humanised lymph was issued from the National Vaccine Establishment in 5,061 capillary tubes; and calf lymph was sent out on 13,798 ivory points, and in 570 capillary tubes. (App. A., No. 3.)

The number of primary vaccinations performed by the several operators at the Board's Animal Vaccine Station during 1897 was 5,693; the insertion-success ranging from 97·46 to 84·62 per cent. The number of re-vaccinations was 643 (App. A., No. 4.)

GLYCERINATED CALF-LYMPH LABORATORY

Following on the receipt of a report by Dr. Copeman and myself on the Preparation and Storage of Glycerinated Calf-Lymph, which I submitted to you in my last Annual Report, action was taken, under your instructions, for the institution in this country of such measures as would be necessary for the distribution of such lymph from the National Vaccine Establishment.

I am now able to report that arrangements have been made for the inoculation of special calves, and for the preparation of the lymph collected from them in the glycerinated form. These arrangements include the renting for the Board's purposes, of laboratories, &c., at the premises of the British Institute of Preventive Medicine on the Chelsea Embankment, and the selection of a laboratory staff, including Dr. Frank Blaxall, whom you have appointed as Bacteriologist, and who has had considerable experience in this class of work. Mr. H. Stuart Fremlin has also been appointed Assistant Bacteriologist. The distribution of glycerinated calf-lymph by the Board will be commenced on the 1st of January, 1898, when the Vaccination Act, 1898, comes into operation.

2. OTHER ADMINISTRATIVE BUSINESS OF THE MEDICAL DEPARTMENT.

Your medical staff were engaged during the year in numerous inquiries and conferences, many of which find no public record by way of reports, such, for example, as those having reference to formal inquiries into local proposals for the raising of loans in respects of hospitals and the like, conferences with medical officers of health as to the discharge of their duties, and investigations of cases in which death certificates have been reported to us by local registrars and others as making mention of vaccination in the entry relating to the cause of death. Nevertheless these and cognate matters have occupied much time.

During 1897, as in former years, there were many instances in which representatives and officers of local authorities attended at the office and conferred as to plans of proposed hospital buildings, their disposition on site, and other points relating to hospital construction and administration, and also on the subject of proposals for bye-laws. These conferences proved to be distinctly helpful, and to be productive of results which could hardly have been achieved by formal correspondence.

Proposals for the revocation of bye-laws in the parish of Cowfold, recently added to Horsham Rural District, and for the adoption of bye-laws of exceptional nature at Henley-on-Thames were made the subject of local inspection; and local inquiries in connexion with proposals relating to the provision of hospital sites and buildings, the formation of hospital districts and joint boards, or matters of an analogous character, were held in the following cases, namely:—Abingdon (Urban and Rural) Joint Board, Barnsley, Braintree (Urban and Rural) Joint Board, Chepping Wycombe, Chester, Chorley Joint Board, Christchurch Rural, Clare and Bumpstead (Rural) Joint Board, Colne, Crewe, Croydon Rural, Croydon (Urban and Rural) and Wimbledon Joint Board, Foleshill Rural, Gosport and Alverstoke, Halifax Union Sanitary Authorities as to combination for the provision of isolation accommodation for small-pox patients, Hanley, Stoke, and Fenton Joint Board, Horfield, Keighley and Bingley Joint Board, Kingsthorpe, Llandrindod Wells, Llandudno, Loddon and Clavering Rural, Newmarket and Moulton (Rural) Joint Board, Newport (Mon.), Oakwell Joint Board, Paignton, Peterborough, Pontefract Joint Board, Richmond and Heston and Isleworth Joint Board, Rotherham, Saffron Walden, Sandgate, Sevenoaks, Sheffield, Southampton, Southall-Norwood, Staines, Tewkesbury Rural, Isle of Thanet Joint Board, Tiverton Joint Board, Tutbury Rural, Wakefield Rural, West Ham, Isle of Wight (Rural), Workington, Worcester, and Great Yarmouth. In addition to the above, inquiry was instituted as to appeals to the Board against the inclusion of their districts in hospital areas created by the County Councils for Derbyshire, Devonshire, and the West Riding of Yorkshire, made respectively by Bonsall Urban, by Brampton and Walton Urban and Clown Rural, by Newton Abbot Urban, and by Handsworth Urban District Councils.

With regard to the question of public scavenging under section 42 of the Public Health Act, 1875, local inspection was deemed to be desirable and was made in the cases of the Auckland

Rural District, Bishopstoke and St. Faith Without (New Winchester Rural District), Chatham, Consett, Morton (Gainsborough Rural District), Mottram-in-Longdendale, Needham Market (Bosmere and Claydon Rural District), Rochester, Shifnal Rural District, Tow Law, and Witney. Inquiries were also held as to a proposal for a night-soil tip at Rawmarsh, and the provision of a shelter at Limehouse; and inspections having reference to the housing of the working classes were made of a small area in the City of Canterbury by Dr. Buchanan, and of the "Ann Street" site at Poplar by Dr. Parsons.

In the autumn of 1897 a serious epidemic of enteric fever broke out in Maidstone, and Dr. Theodore Thomson was instructed to visit the borough, to investigate the causes of the outbreak, and to advise the Town Council as to the measures which they should adopt in order to cope with the sudden emergency, and to control, as far as practicable, the further spread of the disease. As the result of work spread over a period of some two months he arrived at the conclusion that the epidemic was primarily due to the specific pollution of one of the sources of the public water service of the borough, and that its later diffusion was in some measure caused by defective local sanitary circumstances. He had also commenced an etiological investigation as to the precise point or points at which specific matter had gained access to the particular water-service, when all personal investigation and formal report by him had to be set aside by reason of reiterated demands on the part of the Town Council and of certain of the inhabitants of Maidstone for a "public" inquiry. After some delay, due, amongst other reasons, to the inability of the officers of the Council to take part in the inquiry without seriously interfering with the duties then devolving on them with a view of checking the spread of the disease, and, later on, to a request on the part of the Council for the postponement of the inquiry until after the issue of an official report by Dr. Thomson, a formal inquiry by the taking of evidence was commenced on January 31st, 1898. The report on this inquiry does not form part of the proceedings of the Medical Department.

Among the detailed investigations made by Medical Inspectors (see App. A., No. 5), other outbreaks of enteric fever formed the subject of inquiries at Aldbrough (Skirlaugh Rural District) by Dr. Reece, at Horsforth by Dr. Bruce Low, at King's Lynn by Dr. Mivart, and by Dr. Buchanan at Wadebridge (St. Columb Major Rural District); and in connexion with the occurrence of cases of the disease in six sanitary districts in Essex and Suffolk, in relation with the consumption of oysters from certain layings at Brightlingsea.

Prevalences of diphtheria were investigated at Shipton-under-Wychwood (Chipping Norton Rural District) and Worcester by Dr. Fletcher, in the Smallburgh Rural District by Dr. Copeman, in the Watford Urban and Rural Districts by Mr. Royle, and at Wrexham by Dr. Wheaton. Two detailed inquiries had reference to measles, the first by Dr. Fletcher at Droylsden, the

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other by Dr. Theodore Thomson at Lancaster. Dr. Thomson also made inquiry into a case suspected to be cholera at the Holborn Union Workhouse.

As regards sea-borne exotic disease, I have but little to say. On learning of the expected arrival at Plymouth of the cholera-infected transport "Nubia," Dr. Bulstrode was instructed at once to visit the port and to advise as to the measures of precaution necessary to be adopted. He also made inquiry into the circumstances associated with the occurrence of a case of plague on board the troopship "Dilwara" while eastward of the Red Sea, and conferred with the responsible authorities at Southampton as to the local action which would be called for on the arrival of the vessel. In this matter the officers of the Navy, Army, and Port Sanitary Authority, were concerned, as well as of your own Department; but there was complete agreement on the part of all as regards the measures to be taken in connexion with the disease, which has only quite recently been placed within the scope of the preventive powers of local health bodies.

An outbreak of illness of an anomalous nature in the Glanford Brigg Rural District was reported on by Dr. Bruce Low, who regarded the disease as having the characteristics of cerebro-spinal meningitis. The same Inspector made inquiry into the sanitary condition of the gathering grounds of the Bury Corporation Waterworks; and, together with one of your Engineering Inspectors, also held inquiry with reference to the proposed formation of a Joint Committee for purposes of prevention of pollution of the River Dee. Inquiries into questions of local sanitary administration were held in the Districts of Bewdley, Kidderminster Rural (as to Wribbenhall), Rotherhithe, and Woking, by Dr. Theodore Thomson; Eaton Bray (Rural), Great Ouseburn (Rural), and Swanage, by Dr. Wheaton; and Hayle and Phillack by Dr. St. George Mivart. Dr. Theodore Thomson, together with Major-General Crozier, held an Inquiry into the septic tank system of sewage purification which had been experimentally adopted at Exeter.

Inquiries relating to port sanitary administration, and having reference mainly to the constitution of districts, were held as regards the port sanitary districts of Chester, Colchester, Harwich, Liverpool, Manchester, Milford, Newport (Mon.), Preston, and Wisbech; and a special survey of certain port and riparian sanitary districts, made in anticipation of a threatened importation of plague, included the Urban District of Barrow-in-Furness and the Port Districts of Barry and Cadoxton, Bristol, Cardiff, Chepstow, Gloucester, Hull and Goole, Liverpool, London, Manchester, Milford, Newport (Mon.), Portsmouth, Preston, River Tees, River Tyne, Rochester, Southampton, and Swansea. I now proceed to comment in more detail on some of the enquiries referred to.

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In this country of recent years, and especially since investigations made for the Board by Dr. Bulstrode have shown that there are certain points along the coast of England and Wales where oysters are stored in such a manner as to be liable to pollution by sewage, the relation between these shellfish and enteric fever has received considerable attention from numerous inquirers. Reports by Medical Officers of Health and others have put on record a number of instances where in course of inquiry into a case or cases of enteric fever a coincidence has been found between the date upon which infection was presumably contracted and the date upon which uncooked oysters had been consumed by the sufferer or sufferers. And in certain of these instances, as where no likelihood of exposure to any agency of infection other than oysters could be heard of, and where the oysters implicated could be referred to layings or places of storage known to be exposed to pollution by sewage, the facts have been held, on sufficient grounds, to warrant presumption that oysters have operated as the infecting agent. Commonly in a given case of this sort, however, circumstances have not permitted any estimate of the degree of probability which attaches to this explanation. For it has rarely happened that the case in question could be associated with any considerable number of other recently occurring fever cases suspected on similar grounds to be due to oysters.

In October, 1897, however, the Medical Department learnt through Dr. J. W. Cook, Medical Officer of Health of certain urban and rural districts in East Essex, that cases of enteric fever in which infection was believed to have been conveyed by oysters had recently occurred in considerable number in certain parts of Essex and Suffolk. From the information which Dr. Cook was already able to give respecting those of the cases which had occurred within the districts under his charge, it was evident that investigation of the whole series of cases was called for, and accordingly Dr. Buchanan was instructed to make inquiry into them. His report will be found in Appendix A., No. 6. The total number of cases, suspected to be due to infection conveyed by oysters, with which Dr. Buchanan had to deal was 26. All these persons had been attacked by enteric fever at dates between the beginning of June and the end of October, and in no instance was there reason to doubt the diagnosis. Their dwellings were situated in various parts of Essex and Suffolk, being comprised indeed in no fewer than six separate sanitary districts. On detailed inquiry as to the history of each case and as to prevalence of fever in the several localities, Dr. Buchanan obtained information to this effect: —

There was little doubt that each of the 26 persons had come by his infection at one or other of certain places on the Essex coast, namely Clacton-on-Sea, Walton-on-the-Naze, and St. Osyth village. Each of the 26 persons had, as matter of fact, partaken of oysters, either at Clacton, Walton, or at St. Osyth, at a date antecedent to his illness which was consistent with his having received infection in this way. From the beginning of June to the end of October, no attacks of enteric fever, other than the 26 in question, could be heard of as having occurred among inhabitants of, or visitors to, these three places. And inquiries

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made in each instance for conditions, irrespective altogether of oysters, to which the sufferers had been subjected antecedent to their attack, and which could be thought of as having been concerned with the causation of their fever, had uniformly been without affirmative result.

The facts thus summarised sufficed to establish a strong probability that all the 26 persons in question had received infection by way of oysters, and this apart from any question of the origin of the particular oysters implicated. The history of these oysters had now to be investigated. After inquiries of sundry keepers of oyster stalls, middlemen, and merchants, it was ascertained, firstly, that the oysters implicated in at least 25 instances could be referred, almost with certainty, to layings in Brightlingsea Creek; secondly, that in 20 instances the facts obtained were sufficient to warrant the inference that the oysters in question had been taken, prior to delivery to their respective vendors, from one or other of two particular layings situate in that Creek.

Now Brightlingsea Creek had been surveyed by Dr. Bulstrode in 1895, and in his report, to which I have already alluded, he has drawn attention to the fact that oysters laid down hereabouts were in notable degree exposed to pollution by sewage from the town of Brightlingsea, which was being discharged, untreated, by three outfalls into the tidal water of the Creek. Conditions precisely similar to those reported by Dr. Bulstrode were found to have obtained during 1897. Furthermore, Dr. Bulstrode had indicated a particular series of oyster layings situated on a foreshore in front of the sewer outfalls as being especially exposed to pollution by sewage. It was upon this foreshore—shown on the map which accompanies Dr. Buchanan's report—that the two layings suspected of having furnished a large proportion of the implicated oysters were found to be situate. And lastly, inquiries as to prevalence of enteric fever at Brightlingsea left no doubt that "at sundry different periods "during 1897 infectious matters derived from persons suffering "from enteric fever at Brightlingsea must needs have been discharged from the Brightlingsea sewer outfalls."

In view of all the facts, it seems hardly possible to doubt that in the 26 cases inquired into, infection had been conveyed by Brightlingsea oysters. Whether or no, in the summer and autumn of 1897, oysters from Brightlingsea have been responsible for any other case, or many other cases, of enteric fever outside the areas to which his inquiry was restricted, Dr. Buchanan was not in position to affirm. But, however this may be, it must now be considered demonstrated that as long as the sewage of Brightlingsea discharges as sewage into Brightlingsea Creek, so long will material risk attend the consumption of oysters obtained from layings there. It may be noted with satisfaction that the Council of the recently-formed Urban District of Brightlingsea are now bestirring themselves with the preparation of a scheme which aims at dealing with the sewage of their district in a manner which is intended to obviate pollution of the Brightlingsea oyster layings.

MEDICAL OFFICER'S REPORT.

ENTERIC FEVER AT KING'S LYNN.

In my Annual Report for 1892-93* I drew attention to a widespread outbreak which had caused 226 cases of severe diarrhœa or of enteric fever in King's Lynn between September, 1891, and June, 1892, both of which diseases were ascertained by Dr. Bruce Low to have been due to pollution of the water service. The water supply in question was derived from the river Gaywood, which had multifarious opportunities of being befouled by human excreta. Since that date enteric fever has remained a constantly recurring cause of disease and death in the Borough; and in October, 1897, this fever again became epidemic. As was the case in 1892, so also in 1897, the village of Gaywood, through which the river flows, also suffered from the same disease; and taking the Borough and the village together it was found by Dr. Mivart, whose report on the 1897 epidemic is reproduced in Appendix A., No. 7, that 255 attacks occurred in October, and 96 in November, the fatal attacks during those two months numbering 43. The epidemic was carefully investigated and it again became obvious that the disease was essentially due to the water supply, which, after an interval of some five years, was still derived from the Gaywood river; and this stream in turn still remained exposed to "countless opportunities of pollution," involving at any moment the specific contamination of the public water service. The story of 1897 is practically that of 1892, both as regards the state of the water supply and the disastrous results of its distribution to the inhabitants. The main interest in the story lies in the fact that since it was the inhabitants themselves who for a series of years had persistently thwarted the Town Council in their efforts to substitute a wholesome water supply for the polluted Gaywood service; it at last became imperative for the Local Government Board to issue a Provisional Order enabling the Town Council to proceed with a new scheme of water supply, and thus to protect the population against the results of an opposition carried on with exceptional bitterness and based on ignorance which it is to be hoped is exceptional in this country at the close of the 19th Century.

EPIDEMIC MEASLES AT LANCASTER.

Inquiry was made by Dr. Theodore Thomson regarding epidemic measles in the Borough of Lancaster, a town of which the population, in the middle of 1897, was estimated at 38,228. The outbreak of this disease which forms the subject of his report (App. A., No. 8) occurred mainly in the early months of 1897. The source of the outbreak could not be definitely traced; but its manner of commencement suggested that scattered cases in the Borough in the latter part of 1896 may have formed points of origin of the epidemic that ensued. When once the diffusion had set in, the progress of the disease was rapid; and its extension seems to have been aided by the spread of infection through the agency of elementary schools as well as by personal communication between the sick and the healthy

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* Supplement by the Board's Medical Officer to the Twenty-second Annual Report of the Local Government Board (C.—7412), 1894.

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in their homes. The chief prevalence of the disease occurred during January and February, 1897; after which the outbreak began to decrease, until in the month of July following it had ceased to be regarded as an epidemic. The main sources of knowledge as to occurrence of measles in the district consisted of its notification to the Town Council by medical practitioners and by householders; and of certain information from the school authorities. Measles, formerly a disease the notification of which was compulsory in Lancaster under a local Act, had indeed ceased to be so, through neglect of the Town Council to obtain renewal in 1895 of the necessary Order under that Act; but, as matter of fact, the measles attacks continued to be notified as before. Indeed, effort was made to procure notification on the part of the householder in those cases where no medical man was in attendance, by the distribution from house to house throughout the borough of handbills directing the attention of the householder to his duty in this respect. The manner in which information by means of notification was obtained and utilised was fairly satisfactory; but the method of procuring similar information from the School Authorities was not so efficient. With a view to checking the spread of the disease all invaded houses were visited at least once by an officer of the Town Council; but, owing to insufficiency of staff, second visits to these houses were rare. The measure of isolation of the sick from the healthy in their homes was but small, while the hospital for infectious diseases was not made use of for any cases of measles. Final disinfection of invaded dwellings or of infected articles was not carried out. All public elementary schools in the borough, save two, were closed during a period of two months, with a view to checking extension of the epidemic; and the facts collected by Dr. Thomson in this regard tend to show that this measure was attended with some success. Neither Sunday Schools nor private schools were closed at the instance of the Town Council. One of the principal lessons taught by the Lancaster experience is that the existence of a sufficient sanitary staff for the collection and the prompt utilization of information concerning measles attacks, and for maintaining supervision of those attacked during the infective stages of the disease, is essential to the control of that disease through school agency. For lack of such staff in Lancaster some of the efforts made failed to effect their intended purposes.

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Ever since the Inland Sanitary Survey which was conducted during 1893-95 in view of the possible extension to this country of the cholera, then prevailing on the continent of Europe, the Board have not been without concern as to certain risks of pollution to public water supplies, the use of which has been held by the water purveyors to be free from chance of danger; and the recent reports on epidemics of enteric fever issued from the Medical Department have amply sufficed to show that the Board's concern has been well founded. Under these circumstances the Board have from time to time instructed their Medical Inspectors to report to them in detail as to the sources from whence certain public bodies derive their water. I reproduce in Appendix A., No. 9, a report by Dr. Bruce Low on the gathering grounds of a water service which is in the hands of the Bury Corporation, as a type of this class of work.

The public water service in question is the property of the Corporation of Bury, who, besides delivering the water to their own Borough, supply wholly or in part eight adjoining districts; and from some of the health authorities of these districts repeated complaints had been received as to the bad quality of and other defects in the supply delivered to them. The Bury water supply is derived from six gathering grounds, varying from 202 to 3,313 acres in extent, and there are nine impounding or service reservoirs. The several gathering grounds or reservoirs were made the subject of careful inspection by Dr. Low, the details of which will be found in his report.

As samples of some of the conditions met with I would refer to two of the six gathering grounds. On one of these, covering 872 acres, there were houses containing 128 persons; the means of excrement disposal for their dwellings being at times privies discharging down the adjacent slopes. Besides this, slop water, tricklings from manure heaps, and the washings after rainfall from lands manured at times with privy contents were ascertained to flow in the direction of and into a reservoir either directly or by means of streamlets discharging into it.

On another gathering ground, having an area of 1,313 acres, there is a population of 610 persons, two cotton weaving mills lying on streams that feed the reservoir and employing 244 hands, brick and terra cotta works where 50 men and boys were at work, three stone quarries worked by 65 men, and two graveyards. On this gathering ground Dr. Low counted 61 privies, 35 tub closets, and two water closets, some of the privies discharging on to dung heaps. Stable manure is spread over the grass lands, and both slop water and the tricklings from dung heaps are similarly disposed of. As regards one reservoir on this area, it was found that within 130 yards of the main brook flowing into it a space of some 4,560 square yards had been "top-dressed" with tub-closet filth at the instance of the contractor of one of the Corporations whose district is within the area over which the Bury Corporation have water powers. The water from this reservoir is happily only used on occasion for distribution to the inhabitants, being mainly resorted to for the purposes of compensation water.

"No one," says Dr. Low, "who has visited the gathering grounds of the Bury Corporation can deny that, upon some of them at least, there exist conditions which must foul the water and which are highly favourable to the spread of water-borne disease, should the specific poison of such disease by any chance be introduced upon them from without." It is only right to add that the Corporation have from time to time acquired, by purchase, lands and tenements for purposes which have included the demolition of dwellings which, by reason of their occupation, tended to the fouling of their water supply, and that they have recently sought further Parliamentary powers in this direction.

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In Appendix A., No. 10, will be found a report by Dr. Theodore Thomson on the general sanitary circumstances of the Borough of Bewdley. Inquiry on this subject was directed by the Board in consequence of a representation made to them by the Worcestershire County Council, under Section 19 of the Local Government Act, 1888, that the Corporation of Bewdley were in default in not putting in force their powers under the Public Health Act, and particularly as regards water supply, housing of the working classes, and sewerage, including sewage disposal, within their district. Bewdley is a small town of nearly 3,000 inhabitants, situated on the west bank of the river Severn. Air-space round Bewdley houses was found to be generally sufficient; but many of the houses themselves were in a very defective state. The condition of house-yards in the matter of paving was frequently not such as to favour cleanliness in the neighbourhood of dwellings. House-drains, where provided, were seldom properly disconnected from the sewers into which they emptied. The sewers—for the most part old brick barrel structures—were in a defective condition, and contained offensive accumulations of silt. But little effort had been made to procure their efficient ventilation; and the method of flushing resorted to was altogether inadequate. Their contents discharged into the river Severn in a crude state. The prevailing system of excrement disposal was seen to be by cesspit privies; and these, owing to their structure and to accumulation of their contents, were usually the cause of serious nuisance. The arrangements for removal of excreta and of house refuse were likewise unsatisfactory; and, as a consequence, much of the latter was found to be deposited on the surface of yards and roadways in the town and also on the banks of the Severn. The water supply of Bewdley is derived partly from public and partly from private wells, sunk in the Coal Measures or in the New Red Sandstone. Many of the private wells failed to furnish a sufficiency of water during times of drought; and even the public wells cannot all be relied upon for a sufficient supply under these conditions. All wells, public as well as private, were found to be liable to dangerous pollution by the excremental and refuse matters that leak from defective sewers, drains, and cesspits. These unwholesome conditions, abounding in Bewdley, and clearly indicative of long continued mal-administration by the Town Council, and the manner in which the question of the water supply of their district has for many years been trifled with by them, as recounted by Dr. Thomson in his report, afford sufficient illustration of their neglect of the duties that devolve upon them as Sanitary Authority. The Worcestershire County Council are evidently justified in the complaints which formed the subject of their representation to the Board; although Dr. Thomson noted in the course of his inspection that the Bewdley Town Council were taking some steps in the direction of procuring better housing of the poorer classes. There are, however, other matters, not particularly specified in the representation of the County Council, which also call for the attention of the Bewdley Town Council. Notable among these are the methods for the disposal and removal of excreta and house refuse; besides which the conditions of house-drainage and of yard-paving also stand much in need of improvement.

I include in Appendix A., No. 11, a compilation, quarter by quarter for the year 1897, of the notified attacks and the certified deaths from certain infectious diseases in 93 urban sanitary districts of England and Wales for which the necessary data were available. In the case of the sanitary districts of the Metropolis, the same information is set out also week by week.

II.—Cholera Prevalences.

CHOLERA IN EUROPE AND OTHER COUNTRIES, 1894-95.

Owing to the illness and subsequent death of Dr. Barry, I have been unable since the issue in April, 1896, of my Annual Report for 1894-95, to continue in any detail the account of the western diffusion of cholera on which I have already reported up to the close of 1893. Dr. Bruce Low has now, however, with such aid as he could obtain from data compiled by Dr. Barry and from investigations of his own, continued the history of this prevalence of cholera up to the end of 1895, and I submit the account which he has written in Appendix A, No. 12.

Cholera which had been epidemic in Europe during 1892 and 1893, continued to prevail during 1894 and 1895, though happily in diminishing amount. The countries which chiefly suffered during the two last-named years were Russia, Austria, and Turkey; but outbreaks of cholera occurred also in Belgium, Germany, Holland, and France. The prevalences of cholera during 1894 were mainly continuations of local epidemics of 1893; some were due to the recrudescence of infection in localities that had suffered severely in the previous year. The principal area of cholera prevalence in Europe during 1894 and 1895 was Russia, more especially certain Russian Governments immediately adjoining the frontiers of Austria and Germany. Across the frontiers of these countries the disease was carried again and again by travellers. The river Vistula with its tributaries rising in Western Russia flows through North Eastern Germany to the sea, and frequent importations of cholera into Germany from Russia by bargemen and river raftsmen occurred, the outbreaks taking place in riverside towns and villages on the banks of the Vistula or on some of the numerous waterways communicating with it. It is worthy of mention that cholera was epidemic in Russia in each of the four years 1892-95; and that during that period no fewer than 235,076 fatal attacks occurred in the Russian Empire. Of these deaths the largest number recorded in any one of the four years took place in 1892, when 151,626 fatal cases were certified. The smallest number was in 1895 when the cholera deaths were 12,003.

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In Austria, cholera was epidemic in 1894 and in 1895, chiefly in the province of Galicia where the insanitary condition of certain localities offered conditions specially favourable to the development of outbreaks of this disease.

The information obtainable regarding the incidence of cholera in Turkey is somewhat scanty, but it is known that winter epidemics of the disease occurred in the successive seasons 1893-94, and 1894-95. Other outbreaks which were reported from the Turkish provinces were in some instances associated with polluted water-supplies and gross insanitary conditions; the specific poison being at times introduced by troops arriving from infected districts. The antiquated restrictions resorted to in order to deal with these outbreaks had little effect in checking them. Sanitary cordons and the like only added to the already existing misery in cholera-stricken localities by interfering with food supplies and destroying trade.

The annual pilgrimage of 1894 to the Holy Places in the Hedjaz passed off without any such cholera outbreaks as occurred in 1893; but that of 1895 was followed by the occurrence of cholera among the pilgrims as well as among the populations of the towns and villages through which the pilgrims pass on their journey to and from Mecca, &c. There is little doubt but that the insanitary state of the quarantine stations where the pilgrims were detained was at the onset largely responsible for the spread of the epidemic. At the close of the pilgrimage of 1895, the returning pilgrims carried cholera with them to Morocco and to Egypt, where epidemics occurred in the autumn of that year. The prevalence of cholera in Egypt during 1895 was not on an extensive scale, but the disease "smouldered" on during the early part of 1896, and in the ensuing summer months it developed epidemic proportions, killing close upon 20,000 persons before the end of the year.

III.—Auxiliary Scientific Investigations.

ANAËRO
BACTER

Microbes of the anaërobic class, *i.e.*, bacteria which subsist and carry on their life processes independently of free oxygen, had not, as I pointed out in a previous report, been obtaining from the bacteriologist and the epidemiologist the attention that perhaps they have deserved. In this connexion I instanced bacillus enteritidis sporogenes as especially worthy of notice.

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This anaërobic microbe, discovered in 1895 by Dr. Klein as pervading alike the bowel contents of certain diarrhœa patients and the milk which had presumably caused their illness, and which, in later investigation (1896–97) by Dr. Andrewes, was not to be obtained from the bowel discharges of healthy persons or of persons suffering from ordinary casual diarrhœa, has accordingly been, during 1897–98, subjected to further careful study. As a result, this particular bacillus has not only again been found associated with "food-poisoning" due to milk, but also with summer diarrhœa of infants and with English cholera: and further, we learn that though widely distributed in nature the microbe is especially abundant and virulent in animal excreta and in matters contaminated therewith, namely, crude liquid house refuse, manured earth, and sewage polluted water. Appendix B., No. 1, of this volume is wholly devoted to this obviously important microbe, and it will now and again be referred to, incidentally and in interesting connexion, in other Appendices,—B., No. 2, and B., No. 4.

In Appendix B., No. 1, Dr. Klein gives an account of this anaërobic bacillus: of its morphology and biology; of its observed relations with infantile diarrhœa and with English cholera; and notes also some of the conditions of its occurrence in milk, in excrement, and in sewage. So far as Dr. Klein's investigation of bacillus enteritidis sporogenes has gone, he finds presumptive evidence that this microbe is intimately concerned in the causation of infantile diarrhœa and of English cholera; but in the absence as yet of any satisfactory method of detecting bacillus enteritidis in diarrhœa-material unless it be present in spore form, he is prevented from speaking with complete confidence on this point. Further, he has ascertained that milk as sold retail in this country is apt to contain spores of the bacillus; and, experimentally, that, among food stuffs, milk is a specially favourable multiplying ground for the bacillus; and that after growth in this medium, whether or not it form spores, it is apt to be specially vigorous and to exhibit great virulence. He has yet to learn what, in this and other media, are the conditions which determine spore formation in the particular species and what the circumstances which tend to enhance or to annul its virulence. Meanwhile he has, he believes, ground for regarding the bacillus as primarily derived from excrement, and for considering its presence in water, earth, and the like, as a more trustworthy criterion of direct fæcal pollution than the presence merely of bacillus coli.

SOIL INVESTIGATIONS.

The very different ability, ascertained by Dr. Sidney Martin in 1896–97, of the typhoid bacillus to maintain its existence in organically polluted and in virgin soil, has involved further investigations which give promise of not little interest and advantage. Dr. Martin's experiments, it will be remembered, were preliminary only; he dealt as matter of first instance with sterilised soil. But he found that the microbe in question when it was implanted, in the absence of other bacteria, into soil obviously organically polluted, speedily increased and spread abroad; whereas when, again in the absence of other bacteria, it was sown in soil from an area altogether uninhabited and uncultivated, it languished and quickly died out. It was, therefore, determined that Dr. Martin should in 1897–98, not only repeat on a more extended scale his experiments of the previous year, but also should go on to test in unsterilised soil of both classes the ability of the typhoid bacillus to contend with the other microbes

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normally present in such soils. And further, in view of the demonstrated importance of soil, especially polluted soil, as a multiplying ground for disease germs, it was determined to seek a better basis of differentiation of polluted and unpolluted soils than we at present possess; and to this end investigation was planned of the relation between the degree of contamination of one and another soil with organic matter and the number and character of the bacteria inhabiting these soils, the research in this sense being committed to Dr. Houston.

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Under the heading "Chemical and Bacteriological Examination of Soils with reference to the Amount and Nature of the Organic Matter and the Number and Character of the Bacteria contained in them," Dr. Houston gives in Appendix B., No. 2, an account of his proceedings in this direction. In all, he dealt with 21 samples of soil representing: Virgin soils free almost of vegetation and virgin soils abounding more or less with vegetable matter; orchard and garden soils manured and not manured; and pasture soils—some virgin in the sense that they had not been dressed with manure, others grossly contaminated with raw sewage. Chemically, he tested each sample in respect of moisture, free ammonia, organic nitrogen (including oxidised nitrogen), and oxygen absorbed from permanganate. Bacteriologically, he tested the quantity of bacteria in each sample, and determined for each soil the nature of the bacteria which were present in greatest abundance, paying special attention to such as appeared to exist in the soil in spore form. Also, he made particular search in each instance for microbes commonly present in excrement—such as bacillus coli and bacillus enteritidis sporogenes. His purpose was to ascertain whether by any one, or by any combination, of the tests which he employed he could obtain trustworthy indication, on the one hand, that a given soil, whether or not abounding with vegetable matter, is free from comparatively recent excremental pollution; or, on the other hand, could determine the degree to which any particular soil had been subject to comparatively recent contamination by animal excretions.

Chemically tested, Dr. Houston found that none of the methods employed could be regarded as sufficient for the desired differentiation. Thus, although manured soils from pasture, orchard, or garden yielded to chemical tests affirmative response as regards contained organic matter to a far greater degree than virgin soils that were free almost from vegetable matter, yet a similar high degree of chemical response was obtained in the case of peaty soils which were none the less virgin in the sense of not having been subjected to excremental pollution.

Bacteriologically, and with reference to the number of bacteria in soils, Dr. Houston found, as was to be anticipated, that each of three experimental soils which were virgin and almost free chemically from organic matter, contained by comparison a notably small proportion of microbes. But in virgin soils abounding more or less with vegetable matter, and also in orchard, garden, and pasture soils which had not been manured, the number of microbes was found to vary within very wide limits. Upon the whole, however, the quantity of microbes in such soils was less than in the case of manured pasture, orchard, or garden soils; and it was samples of two soils which had most freely and most recently been subject to excremental pollution which proved in each instance to contain an altogether exceptional quantity of microbes.

As regards particular bacteria:—In eight of the twenty-one soils examined—namely, two virgin soils which contained vegetable organic matter, three virgin soils in which vegetable organic matter was almost absent, an unmanured pasture soil, an unmanured orchard soil, and one recently manured garden soil—Dr. Houston failed to discover bacillus coli or any bacillus strongly resembling bacillus coli. As to the remaining thirteen soils, subcultures in each instance were made of the microbes therefrom presenting *primâ facie* resemblance to bacillus coli, and the capacity of these microbes was further tested as regards production of indol, formation of gas in shake culture, and acidity and coagulation of milk. In the case of nine of these thirteen soils a coli-like bacterium was found to possess culturally, in the case of subcultures from orchard or garden soils a strong, and in the case of subcultures from virgin soils a faint, resemblance to "typical bacillus coli," but nevertheless they all failed to respond affirmatively to every one of the tests employed. But in the case of the remaining four of the thirteen soils yielding coli-like organisms, the suspected bacterium responded in every instance to *all* of these tests; and thus, Dr. Houston infers, each of these four soils is to be considered as containing "typical" bacillus coli. As matter of fact, of the four soils in question, two had been recently and heavily polluted by excrement, while other two appear to have been exposed, though in less degree, to excremental contamination.

On testing each of the 21 samples of soil qualitatively and quantitatively for bacillus enteritidis sporogenes, Dr. Houston ascertained: That in none of three virgin soils almost free from vegetable organic matter, nor in other three virgin soils which abounded more or less in vegetable matter, nor in an unmanured orchard soil, could the presence of spores of this microbe be detected; that in the case of other three soils abounding in vegetable organic matter, but reputedly virgin, and also in the case of certain unmanured orchard and garden soils, spores of bacillus enteritidis, though detectable, were for the most part present in relatively small quantity only: Whereas, in every one of other five soils, an orchard and four manured garden soils, these spores were not only readily found, but were present in greater relative amount than in similar soils which were unmanured or in the three reputedly virgin soils which had been found to contain them. Finally, in a sample of soil which had been recently and heavily exposed to pollution by excrement, and in one other soil which probably had been more remotely exposed to considerable excremental pollution, spores of bacillus enteritidis were found in exceptionally large quantity.

Future workers are likely to find Dr. Houston's exhaustive inquiry not only of value as affording useful indication of means whereby the degree of excremental pollution of soil may be determined, but as instructive also in reference to the several microbes most commonly to be met with in soils of the sorts which he studied. If it be hereafter established that certain of these microbes are constantly and abundantly present in particular soils, and are absent from soils of dissimilar sort, much advantage will, as Dr. Houston points out, accrue to the bacteriologist who is endeavouring to ascertain whether the washings of one or another surface soil have had access to sources of water supply. In any case, search in water-supplies for microbes, such as bacillus enteritidis, which do not appear to exist in any considerable quantity in pure soils, but which appear to be relatively abundant in excrementally polluted soils, is likely to prove of considerable value in considering the question of contamination.

TYPHOID BACILLUS SOIL.

In continuation of his researches into the viability of the typhoid bacillus in sterilised soil, Dr. Martin has submitted to experiment nine additional samples of earth (Appendix B., No. 3). As before, some soils were *primâ facie* favourable, others unfavourable to the growth of the bacillus. The result has been wholly to confirm his previous observations. Soils obviously polluted with animal organic matter sustained, while virgin soils proved hostile to, the life-processes of the microbe. Virgin soils were hostile in the above sense whether or not they contained abundance of vegetable organic matter. In sterilised soils favourable to the typhoid bacillus, diverse temperature, provided always the soil remained moist, made little difference to the microbe. It maintained itself in such soil at 37° C., at the ordinary temperature of the laboratory, and also under the temperature conditions (3° to 16° C.) of an out-of-door shed. In a particular experiment with sterile organically polluted soil, the typhoid bacillus maintained its existence for 456 days; and, furthermore, towards the end of this period, this "soil-culture" of the bacillus, after it had been dried and powdered to dust, still yielded the microbe in viable condition, and, presumably, in virulent phase.

Dr. Martin's more difficult task of testing the ability of the typhoid bacillus to maintain itself in soil in which it is brought in competition with other bacteria, is as yet in its initial stages, but has already yielded interesting result in one instance. To a mixture of the several sterilised soils which were found favourable to the life-processes of the typhoid bacillus, and in which bacteria belonging to the bacillus coli group were ascertained to be predominant micro-organisms, he added broth culture of the typhoid bacillus in the usual way, and placed the sample thus inoculated in an out-door shed, the temperature of which ranged during the experiment between 3° and 16° C. At the end of 50 days the typhoid bacillus was recoverable from this soil at the point at which it had been inoculated. It had survived in competition with the bacillus coli-like micro-organisms, but had not multiplied.

BACTERIOLOGY AS A TEST OF THE WHOLESOMENESS OF WATER.

It was in 1882 the dictum of Sir George Buchanan, my predecessor in office, that, in regard of quality of a given water, "the chemist can, in brief, tell of impurity and hazard, but not of purity and safety"; that, "while we must ever be on the watch for the indications that chemistry affords of contaminating matters gaining access to our waters, we must (at any rate till other methods of recognition are discovered) go beyond the laboratory for evidence of any drinking water being free from dangerous organic pollution"—"must go . . . . in search of the conditions surrounding water sources and affecting water services."

Notwithstanding that the bacteriologist has since 1882 come to our aid, it may be doubted whether we are yet in possession of laboratory methods for the prompt and certain recognition of uniform purity and safety of water. But there can be no question at all that in bacteriology we have a ready means of detecting contaminating matters in waters which, from the chemists' view-point, would be classed as "of high degree of purity." In illustration of the delicacy of bacterioscopic tests, as compared with chemical tests, in detecting undesirable, if not dangerous, ingredients in water, I append a paper (Appendix B, No. 4), recording certain joint laboratory experiments by Drs. Klein and Houston. These observers added to a number of separate samples of sterile distilled water various "minimal" quantities of raw sewage, obtaining thereby sewage dilutions ranging between 1 in 100 and 1 in 20,000. These they proceeded to test severally, chemically and bacterioscopically. Their chemical tests consisted in the application of the ammonia and permanganate processes; their bacterioscopic tests were directed to the isolation of bacillus coli and of bacillus enteritidis sporogenes. As a result of their procedures, they ascertained that while the majority of their sewage dilutions would be classed chemically as at least organically safe drinking water, they had no difficulty whatever in detecting in each and all of them not only bacillus coli but also bacillus enteritidis. As a matter of fact, they, in a separate experiment, were able to identify the latter microbe in liquid made up of only one part of crude sewage in each 500,000 parts of distilled water; and similarly, they succeeded in obtaining from a sample (taken below Staines) of Thames water, which contained less than 800 aërobic microbes per cubic centimetre, both this microbe and also bacillus coli.

SCARLATINA "RETURN CASES."

The streptococcus Scarlatinæ or Conglomeratus, discovered by Dr. Klein a dozen years ago alike in the blood of scarlatina patients and in the udder-ulcers of cows the milk from which had been disseminating scarlatina, has, in more recent years and on Continental authority, been found constantly present in the throat secretions of persons in the acute stage of that disease. This latter fact Drs. Klein and Mervyn Gordon have in the course of their researches as to "Return Cases of Scarlatina" fully confirmed. (Appendix B., No. 5.) But though ever present in the throats of patients suffering from this disease in its earlier stages, this streptrococcus could not be found by these observers during convalescence from scarlatina in the skin shed by patients in their progress towards recovery ; nor could it be found by them in the urine of such persons, or in the ear discharge from which some scarlatina convalescents suffer. But in the nasal discharge of persons all but well of their scarlatina this streptococcus was sometimes found, and, most important of all, it was found to persist, and even to recur, in abundance, in the throat secretions of certain scarlatina patients long after these persons had to all appearance completely recovered from their illness.

In all probability it is persons who thus retain, or reproduce, in their throats streptococcus scarlatinæ, at dates many weeks subsequent to their attack, that are able on their return home from hospital to infect other persons brought into close relation with them. Obviously, therefore, further observation on an extended scale is required as to the proportion of scarlatina patients in which this streptococcus scarlatinæ is apt to occur, whether in throat secretion or in nasal discharge, in the post-convalescent stage of their malady.

GLYCINERATED CALF-LYMPH

In a further Report on Glycinerated Calf-Lymph (Appendix B., No. 6), Dr. Blaxall gives an account of one additional year's experience in vaccinating the calf ; in collecting lymph from the calf ; in glycerinating such lymph and in storing it ; and as to the results of his bacterial testing of glycerinated calf-lymph immediately prior to its use in vaccination. In all respects this additional experience has proved satisfactory. It comprised 17 vaccinated calves, the testing of the glycerinated lymph from which involved some 250 plate cultures. Almost invariably agar plates, inoculated, *four weeks subsequent* to collection and glycerination, with samples of the lymph from these 17 calves, failed to exhibit growth of extraneous micro-organisms. In the few instances, in which microbic growth appeared on such "four-week plates," the resistant bacterium proved to be either bacillus subtilis or bacillus mesentericus vulgatus, microbes which, as later experience showed, may be practically excluded from lymph by scrupulous attention to the cleansing of the vaccinated area on the calf immediately antecedent to collection of lymph from the vesicles.

For the rest, Dr. Blaxall has carried on a series of interesting experiments on the viability of the tubercle bacillus in glycerinated calf-lymph to which this pathogenic microbe had been purposely and abundantly added ; and on the activity quâ vaccination of samples of glycerinated calf-lymph which, after having been found free of extraneous micro-organisms, had been subsequently stored for considerable periods of time. He finds that the added tubercle bacillus is invariably killed off by a month's sojourn in this glycerinated lymph ; that after having been thus dealt with it will not grow in its appropriate culture media, nor produce any pathogenic effect whatever on the guinea pig. And as regards the keeping quality of glycerinated lymph, he finds that at a period nine months subsequent to its having been demonstrably free from extraneous microbes, it is potent to cause in babies vaccinia vesicles in 100 per cent. of the points at which it was inserted.

MICROBES OF VARIOLA.

In Appendix B, No. 7, Dr. Klein supplies a further note on the small bacillus, *bacillus albus*, isolated by him from scabs of the eruption of human variola. With a pure culture of this bacillus he obtained last year some results simulating vaccinia in a particular calf, two out of 49 cutaneous insertions of the material having afforded what might be thought of as positive result. He was able to transmit the local disease thus induced to other calves, but none of them, including the calf of initial experiment, resisted subsequent vaccination with current calf-lymph from the Board's Animal Vaccine Station. He has since further tested his cultures of this bacillus by inoculating such culture repeatedly in large amounts *subcutaneously*, instead of cutaneously, into calves and into monkeys. In neither animal was any notable effect, local or general, produced. The calves four or five weeks after the termination of the experiment were found fully susceptible to typical vaccinia on their vaccination with current animal vaccine lymph ; the monkeys were not tested in this fashion, for the reason that they died meanwhile of some inter-current diarrhœal malady.

I have the honour to be,
Sir,
Your obedient Servant,
RICH$^{D.}$ THORNE THORNE.

November 1898.

APPENDICES.

APP. A., N

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APPENDIX A.

No. 1.

DIGEST of the VACCINATION OFFICERS' RETURNS with regard to children whose Births were registered in the Year 1895.

The following is a summary of the twenty-fourth annual return under the Vaccination Act, 1871. Of 921,512 births returned to the Board by the several Vaccination Officers in England and Wales as registered during the year 1895, the number which, at the time the return was made, had been registered as successfully vaccinated was 624,690 (being 67.8 per cent. of the whole), and the number registered as having died unvaccinated was 104,830 (or 11.4 per cent. of the whole). Of the remaining 191,992 children, 2,962 (or 0.3 per cent. of the whole) had been registered as insusceptible of vaccination; 16 (or 0.002 per cent.) as having contracted small-pox before they had been vaccinated; 13,997 (or 1.5 per cent.) as having their vaccination postponed by medical certificate; leaving 175,017 (of 19.0 per cent.) as "removed," "not to be traced" or otherwise unaccounted for. If from the 921,512 births returned by these officers deduction be first made of the deaths that took place before vaccination, it appears that of the surviving 816,682 children, there were registered at the time of the return 76.5 per cent. as successfully vaccinated; 0.4 per cent. as either insusceptible of vaccination or as having had small-pox; and, including 1.7 per cent. as under medical certificate of postponement, 23.1 per cent. as at that time not finally accounted for as regards vaccination.

The proportion of cases not finally accounted for in England and Wales for 1895 is 20.5 per cent.; in the metropolitan returns 24.9 per cent., in the provincial returns, 19.8. Of the registered births

App. A., No. 1.

Digest of Vaccination Officers' Returns, 1895.

of the twenty-four years 1872-95, the proportion not finally accounted for in regard to vaccination in each year respectively has been as follows: —

—	Metropolis.	Rest of England.	—	Metropolis.	Rest of England.
1872	8·8	4·5	1884	6·8	5·3
1873	8·7	4·2	1885	7·0	5·5
1874	8·8	4·1	1886	7·8	6·1
1875	9·3	3·8	1887	9·0	6·7
1876	6·5	4·0	1888	10·3	8·2
1877	7·1	4·1	1889	11·6	9·6
1878	7·1	4·3	1890	13·9	10·9
1879	7·8	4·5	1891	16·4	12·9
1880	7·0	4·5	1892	18·4	14·3
1881	5·7	4·3	1893	18·2	15·7
1882	6·6	4·5	1894	20·6	19·0
1883	6·5	4·9	1895	24·9	19·8

In 1895 the proportion of cases unaccounted for, after deduction of the postponed cases, in the Metropolis and in the rest of England was 23.4 and 18.2 per cent respectively.

APP. A., I

Digest of Vaccinati
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—	Returns, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
ENGLAND & WALES ..	921,512	624,690	2,962	16	104,830	13,997	175,017	20·5
Ditto (excluding Metropolitan Unions).	787,427	538,651	2,346	15	90,813	12,014	143,588	19·8
METROPOLITAN UNIONS ..	134,085	86,039	616	1	14,017	1,983	31,429	24·9
COUNTIES.								
ENGLAND:								
Bedford	4,542	543	4	..	572	8	3,415	75·4
Berks	7,256	6,020	18	..	615	136	467	8·3
Bucks	4,532	2,751	14	..	447	56	1,264	29·1
Cambridge	5,407	4,435	11	..	511	79	371	8·3
Chester	21,383	17,463	76	..	2,381	332	1,131	6·8
Cornwall	8,629	5,690	4	..	1,053	132	1,750	21·8
Cumberland	7,951	5,624	11	..	836	166	1,314	18·6
Derby	14,918	7,863	30	..	1,808	125	5,092	35·0
Devon	16,775	14,103	44	..	1,479	333	816	6·8
Dorset	5,021	3,943	4	..	405	94	575	13·3
Durham	39,186	27,394	80	..	4,968	653	6,091	17·2
Essex	26,715	18,982	110	..	2,584	718	4,321	18·9
Gloucester	15,498	9,738	61	15	1,721	466	3,497	25·6
Hereford	3,105	2,627	7	..	251	61	159	7·1
Hertford	7,095	5,002	19	..	635	150	1,289	20·3
Huntingdon	1,248	1,065	1	..	117	7	58	5·2
Kent (extra-metropolitan)	22,578	17,617	85	..	2,098	485	2,293	12·3
Lancaster	134,083	87,621	385	..	17,795	1,718	26,564	21·1
Leicester*	12,342	965	2	..	1,938	13	9,424	76·5
Lincoln	13,769	8,601	33	..	1,675	280	3,180	25·1
Middlesex(ex.-metropolitan)	17,465	12,816	107	..	1,640	347	2,555	16·6
Monmouth	10,292	7,742	18	..	1,064	364	1,104	14·3
Norfolk	13,362	7,696	11	..	1,664	128	3,863	29·9
Northampton	9,728	2,492	1	..	1,103	44	6,088	63·0
Northumberland	17,643	12,697	52	..	2,172	272	2,450	15·4

* See footnote to p. 11.

APP. A., No. 1.

Digest of Vaccination Officers' Returns, 1895.

—	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
COUNTIES—*cont.*								
ENGLAND—*cont.*								
Nottingham	17,863	10,793	45	..	2,249	292	4,484	26·7
Oxford	5,025	3,770	15	..	402	54	784	16·7
Rutland	556	481	2	..	48	11	14	4·5
Salop	7,075	5,620	20	..	566	90	779	12·3
Somerset	14,260	9,628	37	..	1,279	237	3,079	23·3
Southampton	19,044	15,539	70	..	1,733	273	1,429	8·9
Stafford	35,397	21,649	110	..	4,716	603	8,319	25·2
Suffolk	10,156	7,817	21	..	1,040	138	1,140	12·6
Surrey (extra-metropolitan)	15,629	11,377	49	..	1,255	320	2,628	18·9
Sussex	14,093	10,087	36	..	1,255	223	2,492	19·3
Warwick	25,602	17,178	141	..	3,226	237	4,820	19·8
Westmorland	1,673	1,480	3	..	133	12	45	3·4
Wilts	6,912	4,244	5	..	517	251	1,895	31·0
Worcester	19,293	14,870	69	..	2,115	253	1,986	11·6
York, East Riding	13,234	9,656	53	..	1,704	150	1,671	13·8
York, North Riding	10,530	7,916	30	..	1,178	169	1,237	13·4
York, West Riding	78,138	51,841	394	..	9,888	843	15,172	20·5
WALES:								
Anglesey	923	822	..	..	73	5	23	3·0
Brecknock	1,575	1 259	..	..	179	28	109	8·7
Cardigan	1,476	1,215	..	..	157	11	93	7·0
Carmarthen	4,271	3,631	1	..	465	22	152	4·1
Carnarvon	3,288	2,705	3	..	390	50	140	5·8
Denbigh	2,874	2,465	4	..	300	53	52	3·7
Flint	2,527	1,978	4	..	235	59	251	12·3
Glamorgan	29,380	24,167	42	..	3,516	358	1,297	5·6
Merioneth	1,720	1,398	2	..	231	48	41	5·2
Montgomery	1,668	1 427	1	..	162	27	51	4·7
Pembroke	2,220	1,894	1	..	222	27	76	4·6
Radno	502	254	..	..	47	3	198	40·0

APP. A., No

Digest of Vaccinatio
Officers'
Returns, 18

METROPOLITAN UNIONS.	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
Bethnal Green	4,791	716	..	..	576	16	3,483	73·0
Camberwell	7,542	4,525	21	..	725	283	1,988	30·1
Chelsea	2,735	2,084	23	..	297	15	316	12·1
Fulham	6,858	5,463	46	..	778	85	486	8·3
George, St., Hanover Square	2,764	2,343	24	..	236	24	137	5·8
George, St., in the East ..	1,982	1,396	5	..	230	36	315	17·7
Giles, St., and St. George ..	1,125	780	5	..	133	6	201	18·4
Greenwich	5,483	4,503	28	1	544	53	354	7·4
Hackney	7,025	1,938	19	..	611	26	4,431	63·4
Hampstead	1,461	1,209	19	..	126	12	95	7·3
Holborn	4,811	3,403	14	..	534	64	796	17·9
Islington	9,901	6,358	61	..	951	53	2,478	25·6
Kensington	3,634	2,844	25	..	374	49	342	10·8
Lambeth	9,371	5,813	46	..	1,078	218	2,216	26·0
Lewisham..	2,486	1,744	13	..	203	5	521	21·2
London, City of	556	425	4	..	56	12	59	12·8
Marylebone	4,421	3,406	14	..	405	51	545	13·5
Mile End Old Town	4,213	1,115	4	..	435	..	2,659	63·1
Olave, St.	4,943	3,329	9	..	530	103	972	21·7
Paddington	2,986	2,378	24	..	302	21	261	9·4
Pancras, St.	7,150	5,313	54	..	669	186	928	15·6
Poplar	6,082	3,347	31	..	690	140	1,874	33·1
Saviour, St.	7,266	4,908	29	..	940	45	1,344	19·1
Shoreditch	4,372	1,678	10	..	609	6	2,069	47·5
Stepney	2,050	1,146	6	..	240	58	600	32·1
Strand	494	357	1	..	58	3	75	15·8
Wandsworth and Clapham..	9,985	7,029	62	..	1,054	372	1,468	18·4
Westminster	851	648	1	..	80	6	116	14·3
Whitechapel	3,138	2,720	6	..	245	10	157	5·3
Woolwich	3,609	3,121	12	..	308	25	143	4·7
	134,085	86,039	616	1	14,017	1,983	31,429	24·9

	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
BEDFORD.								
Ampthill	405	200	2	..	30	3	170	42·7
Bedford	1,335	177	1	..	142	4	1,011	76·0
Biggleswade	788	59	..	..	138	..	591	75·0
Leighton Buzzard	491	8	..	..	57	..	426	86·8
Luton	1,298	30	..	..	180	1	1,087	83·8
Woburn	225	69	1	..	25	..	130	57·8
	4,542	543	4	..	572	8	3,415	75·4
BERKS.								
Abingdon	473	424	1	..	35	5	8	2·7
Bradfield	457	413	..	..	24	3	17	4·4
Easthampstead	350	297	2	..	30	4	17	6·0
Faringdon..	347	289	..	..	21	19	18	10·7
Hungerford and Ramsbury..	487	451	..	..	27	3	6	1·8
Maidenhead	590	476	..	..	47	18	49	11·4
Newbury	577	464	..	..	71	10	32	7·3
Reading	1,833	1,362	7	..	214	52	198	13·6
Wallingford	349	315	3	..	20	3	8	3·2
Wantage	412	368	..	..	25	8	11	4·6
Windsor	958	807	4	..	70	8	69	8·0
Wokingham	423	354	1	..	31	3	34	8·7
	7,256	6,020	18	..	615	136	467	8·3
BUCKINGHAM.								
Amersham	577	238	3	..	45	2	289	50·4
Aylesbury..	645	562	1	..	56	14	12	4·0
Buckingham	270	194	1	..	33	14	28	15·6
Eton..	820	661	6	..	65	6	82	10·7
Newport Pagnell	772	525	3	..	69	10	165	22·7
Winslow	192	21	..	..	16	..	155	80·7
Wycombe	1,256	550	..	..	163	10	533	43·2
	4,532	2,751	14	..	447	56	1,264	29·1
CAMBRIDGE.								
Cambridge	973	712	5	..	107	16	133	15·3
Caxton and Arrington ..	192	176	1	..	10	1	4	2·6
Chesterton	837	684	2	..	66	7	78	10·2
Ely	589	475	..	..	50	8	56	10·9
Linton	332	287	..	..	23	5	17	6·6
Newmarket	900	781	1	..	82	26	10	4·0
North Witchford	511	457	1	..	44	3	6	1·8
Whittlesey	193	167	..	..	21	..	5	2·6
Wisbech	880	696	1	..	108	13	62	8·5
	5,407	4,435	11	..	511	79	371	8·3

	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
CHESTER.								
Birkenhead	4,370	3,836	16	..	422	23	73	2·2
Bucklow	1,767	1,541	9	..	162	30	25	3·1
Chester	1,519	1,265	6	..	177	28	43	4·7
Congleton	967	798	2	..	98	44	25	7·1
Macclesfield	1,552	1,299	1	..	180	37	35	4·6
Nantwich	2,117	1,717	5	..	227	54	114	7·9
Northwich	2,071	1,845	1	..	182	16	27	2·1
Runcorn	1,246	1,002	5	..	131	33	75	8·7
Stockport	4,307	2,919	25	..	657	52	654	16·4
Tarvin	396	348	1	..	42	5	..	1·3
Wirral	1,071	893	5	..	103	10	60	6·5
	21,383	17,463	76	..	2,381	332	1,131	6·8
CORNWALL.								
Austell, St.	942	707	..	..	110	9	116	13·3
Bodmin	499	427	..	..	35	8	29	7·4
Camelford	216	165	..	..	11	21	19	18·5
Columb Major, St.	408	281	..	..	46	..	81	19·9
Falmouth	626	58	..	..	61	..	507	81·0
Germans, St.	458	403	1	..	35	6	13	4·1
Helston	594	435	1	..	92	20	46	11·1
Launceston	372	316	..	..	29	6	21	7·3
Liskeard	685	530	..	..	64	8	83	13·3
Penzance	1,382	991	..	..	198	25	168	14·0
Redruth	1,440	756	2	..	256	11	415	29·6
Stratton	203	159	..	..	17	3	24	13·3
Truro	804	462	..	..	99	15	228	30·2
	8,629	5,690	4	..	1,053	132	1,750	21·8
CUMBERLAND,								
Alston-with-Garrigill	78	63	2	..	9	2	2	5·1
Bootle	465	383	..	..	47	18	17	7·5
Brampton	241	198	..	..	15	14	14	11·6
Carlisle	1,719	1,443	4	..	174	68	30	5·7
Cockermouth	2,147	744	1	..	255	4	1,143	53·4
Longtown	208	180	..	..	19	1	8	4·3
Penrith	597	504	1	..	54	18	20	6·4
Whitehaven	1,827	1,536	3	..	194	36	58	5·1
Wigton	669	573	..	..	69	5	22	4·0
	7,951	5,624	11	..	836	166	1,314	18·6
DERBY.								
Ashbourne	564	473	..	..	48	2	41	7·6
Bakewell	857	687	1	..	72	15	82	11·3
Belper	2,170	1,612	5	..	246	1	306	14·1
Chapel-en-le-Frith	700	571	4	..	57	17	51	9·7
Chesterfield	4,794	2,817	11	..	622	64	1,280	28·0
Derby	2,941	283	4	..	454	..	2,200	74·8
Glossop	743	102	..	..	108	..	533	71·7
Hayfield	352	292	..	..	28	6	26	9·1
Shardlow	1,797	1,026	5	..	173	20	573	33·0
	14,918	7,863	30	..	1,808	125	5,092	35·0

PP. A., No. 1.

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—	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
	RETURNS, 1895.							
DEVON.								
Axminster	397	343	..	..	23	12	19	7·8
Barnstaple	1,077	908	2	..	99	26	42	6·3
Bideford	636	565	1	..	44	20	6	4·1
Crediton	460	416	1	..	36	..	7	1·5
East Stonehouse	477	333	1	..	72	10	61	14·9
Exeter	941	751	3	..	91	23	73	10·2
Holsworthy	250	226	1	..	16	4	3	2·8
Honiton	511	457	3	..	37	2	12	2·7
Kingsbridge	451	408	1	..	31	4	7	2·4
Newton Abbot	1,737	1,557	5	..	141	12	22	2·0
Okehampton	453	394	..	..	32	5	22	6·0
Plymouth..	2,564	1,924	7	..	332	43	258	11·7
Plympton St. Mary	735	616	..	..	47	14	58	9·8
South Molton	400	364	..	..	25	4	7	2·8
Stoke Damerel	1,520	1,171	6	..	140	73	130	13·4
Tavistock	650	573	..	..	54	7	16	3·5
Thomas, St.	1,332	1,137	7	..	99	57	32	6·7
Tiverton	760	669	3	..	62	9	17	3·4
Torrington	346	316	..	..	15	4	11	4·3
Totnes	1,078	975	3	..	83	4	13	1·6
	16,775	14,103	44	..	1,479	333	816	6·8
DORSET.								
Beaminster	239	215	..	..	13	5	6	4·6
Blandford	327	263	..	..	30	14	20	10·4
Bridport	321	291	1	..	25	2	2	1·2
Cerne	161	145	..	..	10	1	5	3·7
Dorchester	472	402	..	..	41	6	23	6·1
Poole	863	621	2	..	66	17	157	20·2
Shaftesbury	295	236	..	..	27	6	26	10·8
Sherborne	297	259	..	..	21	2	15	5·7
Sturminster	238	211	..	..	19	3	5	3·4
Wareham and Purbeck ..	439	388	..	..	35	6	10	3·6
Weymouth	908	531	..	..	86	28	263	32·0
Wimborne and Cranborne ..	461	381	1	..	32	4	43	10·2
	5,021	3,943	4	..	405	94	575	13·3
DURHAM.								
Auckland	3,368	2,108	1	..	439	66	754	24·3
Chester-le-Street	2,269	1,812	1	..	297	37	122	7·0
Darlington	1 527	494	1	..	197	..	835	54·7
Durham	2,615	2,038	3	..	344	37	193	8·8
Easington	2,138	1,816	..	..	263	19	40	2·8
Gateshead..	5,180	2,393	7	..	765	67	1,948	38·9
Hartlepool	2,655	2,144	10	..	265	52	184	8·9
Houghton-le-Spring	1,489	1,248	14	..	185	12	30	2·8
Lanchester	2,639	1,887	4	..	327	35	386	16·0
Sedgefield	788	660	..	..	106	4	18	2·8
South Shields	5,335	3,835	11	..	641	127	721	15·9
Stockton	1,982	1,623	4	..	253	6	96	5·1
Sunderland	6,091	4,523	23	..	762	180	603	12·9
Teesdale	591	391	..	..	59	5	136	23·9
Weardale	519	422	1	..	65	6	25	6·0
	39,186	27,394	80	..	4,968	653	6,091	17·2

—	Returns, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
ESSEX.								
Billericay	479	393	1	..	34	11	40	10·6
Braintree	648	548	2	..	49	27	22	7·6
Chelmsford	878	744	1	..	76	13	44	6·5
Colchester	1,036	756	2	..	127	9	142	14·6
Dunmow	418	366	1	..	24	3	24	6·5
Epping	688	601	7	..	46	5	29	4·9
Halstead	397	350	..	..	26	11	10	5·3
Lexden and Winstree ..	558	499	..	..	36	3	20	4·1
Waldon	576	492	1	..	53	5	25	5·2
Ongar	295	248	..	..	23	6	18	8·1
Orsett	969	471	2	..	84	23	389	42·5
Rochford	991	641	3	..	104	20	223	24·5
Romford	2,003	1,383	1	..	223	46	350	19·8
Saffron Walden	423	359	..	..	35	6	23	6·9
Tendring	1,153	949	2	..	109	19	74	8·1
West Ham	15,203	10,182	87	..	1,535	511	2,888	22·4
	26,715	18,982	110	..	2,584	718	4,321	18·9
GLOUCESTER.								
Barton Regis	6,072	4,293	45	..	637	350	747	18·1
Bristol	1,485	1,085	5	..	185	4	206	14·1
Cheltenham	1,267	619	1	1	163	24	459	38·1
Chipping Sodbury	443	324	2	..	37	12	68	18·1
Cirencester	476	388	..	..	47	10	31	8·6
Dursley	292	150	1	..	14	6	121	43·5
Gloucester	1,585	1,003	..	14	237	7	324	20·9
Newent	301	249	..	..	19	12	21	11·0
Northleach	218	174	..	..	27	..	17	7·8
Stow-on-the-Wold	240	201	3	..	27	3	6	3·8
Stroud	990	290	2	..	92	9	597	61·2
Tetbury	176	117	1	..	26	..	32	18·2
Tewkesbury	358	61	1	..	49	7	240	69·0
Thornbury	447	380	..	..	38	8	21	6·5
Westbury-on-Severn ..	765	119	..	..	84	..	562	73·5
Wheatenhurst	142	89	..	..	16	7	30	26·1
Winchcomb	241	196	..	..	23	7	15	9·1
	15,498	9,738	61	15	1,721	466	3,497	25·6
HEREFORD.								
Bromyard	289	232	2	..	16	9	30	13·5
Dore	191	151	1	..	14	15	10	13·1
Hereford	973	833	3	..	79	12	46	6·0
Kington	299	252	1	..	30	5	11	5·4
Ledbury	383	339	..	..	22	3	19	5·7
Leominster	359	318	..	..	22	5	14	5·3
Ross	432	347	..	..	55	8	22	6·9
Weobley	179	155	..	..	13	4	7	6·1
	3,105	2,627	7	..	251	61	159	7·1

PP. A., No. 1.

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	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
HERTS.								
Albans, St.	750	145	2	..	67	10	526	71·5
Barnet	1,254	885	5	..	100	51	213	21·1
Berkhampstead	431	305	..	..	66	12	48	13·9
Bishop Stortford	516	451	..	..	41	4	20	4·7
Buntingford	131	117	..	..	11	..	3	2·3
Hatfield	220	192	1	..	17	..	10	4·5
Hemel Hempstead	390	252	1	..	44	2	91	23·8
Hertford	400	350	1	..	33	6	10	4·0
Hitchin	777	689	1	..	60	2	25	3·5
Royston	427	358	1	..	41	..	27	6·3
Ware	537	445	1	..	46	8	37	8·4
Watford	1,213	771	6	..	104	53	279	27·4
Welwyn	49	42	..	..	5	2	..	4·1
	7,095	5,002	19	..	635	150	1,289	20·3
HUNTINGDON.								
Huntingdon	484	411	..	..	53	5	15	4·1
Ives, St.	397	354	1	..	38	..	4	1·0
Neots, St.	367	300	..	..	26	2	39	11·2
	1,248	1,065	1	..	117	7	58	5·2
KENT (EXTRA METROPOLITAN).								
Ashford, East	367	326	4	..	22	2	13	4·1
Ashford, West	501	418	1	..	41	16	25	8·2
Blean	545	456	4	..	51	9	25	6·2
Bridge	310	262	..	..	25	11	12	7·4
Bromley	1,868	1,284	13	..	180	63	328	20·9
Canterbury	466	383	..	..	39	2	42	9·4
Cranbrook	343	296	1	..	20	3	23	7·6
Dartford	2,230	1,852	8	..	198	25	147	7·7
Dover	1,112	733	2	..	132	34	211	22·0
Eastry	756	658	2	..	59	2	35	4·9
Elham	1,071	875	2	..	105	35	54	8·3
Faversham	766	670	5	..	71	6	14	2·6
Gravesend and Milton ..	610	414	7	..	71	6	112	19·3
Hollingbourn	351	288	..	..	38	2	23	7·1
Hoo	148	138	..	..	9	1	..	0·0
Maidstone	1,276	709	6	..	119	37	405	34·6
Malling	841	741	..	..	74	6	20	3·1
Medway	2,311	2,013	5	..	183	71	39	4·8
Milton	876	667	5	..	87	33	84	13·4
Romney Marsh	176	160	1	..	13	..	2	1·1
Sevenoaks	765	623	1	..	63	40	38	10·2
Sheppey	453	374	..	..	44	20	15	7·7
Strood	1,265	1,048	8	..	146	10	53	5·0
Tenterden	263	231	..	..	20	1	11	4·6
Thanet, Isle of	1,405	1,211	4	..	128	19	43	4·4
Tonbridge..	1,503	787	6	..	160	31	519	36·6
	22,578	17,617	85	..	2,098	485	2,293	12·3

—	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
LANCASTER.								
Ashton-under-Lyne	4,972	1,086	2	..	804	37	3,043	61·9
Barrow-in-Furness	1,611	1,378	..	..	149	15	69	5·2
Barton-upon-Irwell	2,781	1,867	8	..	334	133	439	20·6
Blackburn	6,643	5,092	35	..	847	124	545	10·1
Bolton	7,842	6,356	21	..	993	38	434	6·0
Burnley	5,904	1,519	18	..	870	75	3,422	59·2
Bury	3,780	873	11	..	614	10	2,272	60·4
Chorley	1,911	1,472	6	..	214	17	202	11·5
Chorlton	9,649	6,913	10	..	1,435	47	1,244	13·4
Clitheroe	645	498	1	..	77	15	54	10·7
Fylde, The	1,967	1,424	13	..	259	78	193	13·8
Garstang	284	256	..	..	18	1	9	3·5
Haslingden	2,993	1,834	8	..	368	50	733	26·2
Lancaster	1,539	1,277	9	..	165	23	65	5·7
Leigh	2,929	2,298	3	..	354	21	253	9·4
Liverpool	5,195	4,285	20	..	678	6	206	4·1
Lunesdale	182	152	1	..	9	..	20	11·0
Manchester	5,239	4,368	7	..	664	42	158	3·8
Oldham	5,956	196	..	..	1,093	..	4,667	78·4
Ormskirk	2,833	2,377	20	..	297	30	109	4·9
Prescot	5,697	4,621	27	..	690	53	306	6·3
Preston	4,720	2,905	14	..	789	92	920	21·4
Prestwich	5,184	3,697	7	..	527	120	833	18·4
Rochdale	2,850	315	..	..	478	..	2,057	72·2
Salford	7,699	4891	22	..	1,239	313	1,234	20·1
Todmorden	966	92	1	..	131	..	742	76·8
Toxteth Park	4,360	3,370	28	..	543	39	380	9·6
Ulverston	1,173	1,032	6	..	88	19	28	4·0
Warrington	3,300	2,694	13	..	365	30	198	6·9
West Derby	16,032	13,163	59	..	1,739	185	886	6·7
Wigan	7,247	5,320	15	..	964	105	843	13·1
	134,083	87,621	385	..	17,795	1,718	26,564	21·1
LEICESTER.								
Ashby-de-la-Zouch	1,476	297	1	..	163	3	1,012	68·8
Barrow-on-Soar	716	13	..	..	78	..	625	87·3
Billesdon	127	97	..	..	11	..	19	15·0
Blaby	788	27	..	..	105	1	655	83·2
Hinckley	811	28	..	..	120	..	663	81·8
Leicester	5,961	59	..	..	1,140	..	4,762	79·9
Loughborough	981	38	..	..	158	..	785	80·0
Lutterworth	283	136	..	..	24	4	119	43·5
Market Bosworth	575	185	1	..	70	5	314	55·5
Market Harborough*	..	..	..	..	..	..	..	..
Melton Mowbray	624	85	..	..	69	..	470	75·3
	12,342	965	2	..	1,938	13	9,424	76·5
LINCOLN.								
Boston	1,103	641	1	..	126	25	310	30·4
Bourne	482	358	1	..	65	7	51	12·0
Caistor	447	356	..	..	53	18	20	8·5
Gainsborough	1,104	203	1	..	154	2	744	67·6
Glanford Brigg	1,390	714	1	..	164	..	511	36·8
Grantham..	958	766	3	..	92	13	84	10·1

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* No return relating to children born in the Market Harborough Union during the Year 1895 has been received. The number of births registered was 449.

	Returns, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
LINCOLN—*cont.*								
Grimsby	2,401	1,641	12	..	392	87	269	14·8
Holbeach	446	133	..	..	48	..	265	59·4
Horncastle	486	324	1	..	44	4	113	24·1
Lincoln	1,966	1,451	3	..	265	74	173	12·6
Louth	751	564	1	..	82	27	77	13·8
Sleaford	626	434	..	..	58	8	126	21·4
Spalding	605	159	..	..	49	..	397	65·6
Spilsby	579	488	4	..	53	13	21	5·9
Stamford	425	369	5	..	30	2	19	4·9
	13,769	8,601	33	..	1,675	280	3,180	25·1
MIDDLESEX (EXTRA METROPOLITAN).								
Brentford	4,172	3,335	39	..	407	11	380	9·4
Edmonton..	8,057	5,601	35	..	762	262	1,397	20·6
Hendon	3,555	2,508	26	..	328	70	623	19·5
Staines	854	655	4	..	81	..	114	13·3
Uxbridge	827	717	3	..	62	4	41	5·4
	17,465	12,816	107	..	1,640	347	2,555	16·6
MONMOUTH.								
Abergavenny	739	629	1	..	59	1	49	6·8
Bedwellty	2,765	1,845	1	..	287	201	431	22·9
Chepstow	567	441	..	..	38	5	83	15·5
Monmouth	872	597	2	..	93	21	159	20·6
Newport	3,821	3,098	12	..	438	77	198	7·2
Pontypool	1,528	1,134	2	..	149	59	184	15·8
	10,292	7,742	18	..	1,064	364	1,104	14·3
NORFOLK.								
Aylsham	465	399	2	..	41	3	20	4·9
Blofield	286	214	..	..	34	7	31	13·3
Depwade	587	495	..	..	44	13	35	8·2
Docking	437	381	1	..	33	1	21	5·0
Downham	493	416	2	..	54	4	17	4·3
Erpingham	569	465	..	..	39	8	57	11·4
Faith, St.	378	201	..	..	39	7	131	36·5
Flegg, East and West	322	236	..	..	54	14	18	9·9
Forehoe	318	243	..	..	22	..	53	16·7
Freebridge Lynn	342	297	..	..	27	..	18	5·3
Guiltcross..	253	210	..	..	26	2	15	6·7
Henstead	280	218	..	..	32	..	30	10·7
King's Lynn	605	17	..	..	122	..	466	77·0
Loddon and Clavering ..	357	307	..	..	30	1	19	5·6
Mitford and Launditch ..	715	569	..	..	77	5	64	9·7
Norwich	3,413	275	1	..	622	..	2,515	73·7
Smallburgh	458	350	1	..	36	8	63	15·5
Swaffham..	354	263	..	..	41	7	43	14·1
Thetford	476	413	1	..	43	9	10	4·0
Walsingham	577	471	1	..	40	15	50	11·3
Wayland	278	236	1	..	25	1	15	5·8
Yarmouth, Great	1,399	1,020	1	..	183	23	172	13·9
	13,362	7,696	11	..	1,664	128	3,863	29·9

—	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent of births.
NORTHAMPTON.								
Brackley	306	184	..	..	42	3	77	26·1
Brixworth	323	121	..	..	34	1	167	52·0
Daventry	461	214	..	..	46	4	197	43·6
Hardingstone	321	102	1	..	21	..	197	61·4
Kettering	1,395	20	..	..	202	..	1,173	84·1
Northampton	2,628	89	..	..	314	1	2,224	84·7
Oundle	307	252	..	..	31	1	23	7·8
Peterborough	1,377	1,172	..	..	121	14	70	6·1
Potterspury	356	190	..	..	39	8	119	35·7
Thrapston	383	42	..	..	18	..	323	84·3
Towcester	301	92	..	..	45	12	152	54·5
Wellingborough	1,570	14	..	..	190	..	1,366	87·0
	9,728	2,492	1	..	1,103	44	6,088	63·0
NORTHUMBERLAND.								
Alnwick	695	546	..	..	74	20	55	10·8
Belford	132	116	1	..	10	5	..	3·8
Bellingham	161	134	..	..	12	2	13	9·3
Berwick-upon-Tweed	514	441	..	..	55	8	10	3·5
Castle Ward	756	593	5	..	88	5	65	9·3
Glendale	207	184	..	..	13	1	9	4·8
Haltwhistle	195	61	..	..	13	..	121	62·1
Hexham	924	735	1	..	79	31	78	11·8
Morpeth	2,006	983	1	..	335	17	670	34·2
Newcastle-on-Tyne	6,860	5,188	24	..	820	53	775	12·1
Rothbury	132	119	..	..	7	3	3	4·5
Tynemouth	5,061	3,597	20	..	666	127	651	15·4
	17,643	12,697	52	..	2,172	272	2,450	15·4
NOTTINGHAM.								
Basford	6,302	3,981	13	..	786	101	1,421	24·2
Bingham	346	288	2	..	26	9	21	8·7
East Retford	684	581	..	..	64	5	34	5·7
Mansfield	2,584	1,422	11	..	305	15	831	32·7
Newark	803	681	1	..	88	8	25	4·1
Nottingham	5,353	2,368	14	..	789	119	2,063	40·8
Southwell	516	413	2	..	42	23	36	11·4
Worksop	1,275	1,059	2	..	149	12	53	5·1
	17,863	10,793	45	..	2,249	292	4,484	26·7
OXFORD.								
Banbury	797	285	..	..	70	5	437	55·5
Bicester	358	291	3	..	20	6	38	12·3
Chipping Norton	475	272	1	..	46	5	151	32·8
Headington	968	877	3	..	69	2	17	2·0
Henley	593	473	2	..	50	12	56	11·5
Oxford	617	518	2	..	61	9	27	5·8
Thame	327	280	1	..	27	5	14	5·8
Witney	548	478	3	..	41	9	17	4·7
Woodstock	342	296	..	..	18	1	27	8·2
	5,025	3,770	15	..	402	54	784	16·7

	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
RUTLAND.								
Oakham	287	242	..	..	28	11	6	5·9
Uppingham	269	239	2	..	20	..	8	3·0
	556	481	2	..	48	11	14	4·5
SALOP.								
Atcham	1,287	1,011	4	..	122	45	105	11·7
Bridgnorth	398	344	..	..	30	..	24	6·0
Church Stretton	125	114	..	..	9	2	..	1·6
Cleobury Mortimer	257	229	..	..	19	4	5	3·5
Clun	259	155	..	..	11	..	93	35·9
Drayton	386	354	..	..	25	1	6	1·8
Ellesmere	360	320	2	..	30	1	7	2·2
Ludlow	480	409	1	..	33	8	29	7·7
Madeley	669	587	5	..	59	3	15	2·7
Newport	390	342	..	..	32	3	13	4·1
Oswestry	738	642	7	..	61	13	15	3·8
Shifnal	347	249	1	..	20	..	77	22·2
Wellington	785	334	..	..	78	1	372	47·5
Wem	259	235	..	..	19	1	4	1·9
Whitchurch	335	295	..	..	18	8	14	6·6
	7,075	5,620	20	..	566	90	779	12·3
SOMERSET.								
Axbridge	994	402	5	..	88	8	493	50·4
Bath	1,847	1,379	6	..	202	66	194	14·1
Bedminster	2,750	1,266	7	..	273	10	1,194	43·8
Bridgwater	921	587	..	..	88	27	219	26·7
Chard	644	557	..	..	59	8	20	4·3
Clutton	824	669	1	..	60	6	88	11·4
Dulverton	109	99	1	..	4	1	4	4·6
Frome	575	460	2	..	43	3	67	12·2
Keynsham	1,097	520	2	..	106	20	449	42·8
Langport	372	290	..	..	23	4	55	15·9
Shepton Mallet	401	298	4	..	30	6	63	17·2
Taunton	1,056	895	3	..	92	19	47	6·3
Wellington	519	405	3	..	30	8	73	15·6
Wells	582	485	..	..	49	9	39	8·2
Williton	398	355	..	..	29	6	8	3·5
Wincanton	430	372	3	..	32	2	21	5·3
Yeovil	741	589	..	..	73	34	45	10·7
	14,260	9,628	37	..	1,279	237	3,079	23·3
SOUTHAMPTON.								
Alresford	163	152	..	..	8	1	2	1·8
Alton	413	368	..	..	26	..	19	4·6
Alverstoke	790	695	3	..	71	7	14	2·7
Andover	389	321	..	..	28	19	21	10·3
Basingstoke	546	249	..	..	39	..	258	47·3
Catherington	67	56	..	..	4	..	7	10·4
Christchurch	1,353	867	7	..	130	54	295	25·8
Droxford	320	291	..	..	24	1	4	1·6
Fareham	498	447	1	..	32	3	15	3·6
Fordingbridge	177	157	..	..	15	..	5	2·8

APP. A., No

Digest of Vaccinatio Officers' Returns, 18

	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-Pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
SOUTHAMPTON—*cont.*								
Hartley Wintney	713	571	2	..	79	9	52	8·6
Havant	273	252	..	..	13	3	5	2·9
Hursley	100	89	..	..	6	2	3	5·0
Kingsclere	261	235	..	..	21	2	3	1·9
Lymington	370	311	..	..	31	3	25	7·6
New Forest	374	326	..	..	23	3	22	6·7
Petersfield	275	234	3	..	17	3	18	7·6
Portsea Island	4,896	4,183	29	..	547	31	106	2·8
Ringwood	162	154	..	..	6	..	2	1·2
Romsey	276	244	..	..	21	3	8	4·0
Southampton	1,874	1,539	16	..	203	24	92	6·2
South Stoneham	1,787	1,417	2	..	144	61	163	12·5
Stockbridge	143	129	..	..	8	..	6	4·2
Whitchurch	190	162	2	..	13	3	10	6·8
Wight, Isle of	1,906	1,485	5	..	156	35	225	13·6
Winchester, New	728	605	..	..	68	6	49	7·6
	19,044	15,539	70	..	1,733	273	1,429	8·9
STAFFORD.								
Burton-on-Trent	2,930	1,150	4	..	344	41	1,391	48·9
Cannock	1,550	1,106	2	..	159	13	270	18·3
Cheadle	797	626	2	..	83	16	70	10·8
Leek	1,360	1,085	1	..	151	73	50	9·0
Lichfield	1,397	1,244	9	..	101	10	33	3·1
Newcastle-under-Lyme	1,415	1,260	1	..	133	1	20	1·5
Seisdon	508	372	..	..	51	1	82	16·3
Stafford	865	711	..	..	82	24	48	8·3
Stoke-upon-Trent	4,950	3,689	8	..	801	62	390	9·1
Stone	941	795	1	..	107	12	26	4·0
Tamworth	751	562	2	..	55	12	120	17·6
Uttoxeter	440	346	..	..	51	1	42	9·8
Walsall	3,888	1,828	34	..	660	32	1,334	35·1
West Bromwich	5,019	2,025	22	..	664	133	2,175	46·1
Wolstanton and Burslem	3,316	2,626	2	..	457	..	231	7·0
Wolverhampton	5,270	2,224	22	..	815	172	2,037	41·9
	35,397	21,649	110	..	4,716	603	8,319	25·2
SUFFOLK.								
Blything	728	655	2	..	60	4	7	1·5
Bosmere and Claydon	423	364	..	..	29	4	26	7·1
Bury St. Edmunds	427	338	..	..	54	8	27	8·2
Coxford	471	427	..	..	33	2	9	2·3
Hartismere	362	306	..	..	30	7	19	7·2
Hoxne	310	266	1	..	31	1	11	3·9
Ipswich	1,871	765	7	..	283	53	763	43·6
Mildenhall	246	209	..	..	30	2	5	2·8
Mitford and Lothingland	1,256	996	7	..	129	9	115	9·9
Plomesgate	489	424	..	..	43	2	20	4·5
Risbridge	486	416	..	..	54	3	13	3·3
Samford	354	313	1	..	30	1	9	2·8
Stow	546	487	..	..	38	5	16	3·8
Sudbury	781	643	..	..	70	13	55	8·7
Thingoe	398	347	1	..	30	12	8	5·0
Wangford	394	356	..	..	33	2	3	1·3
Woodbridge	614	505	2	..	63	10	24	7·2
	10,156	7,817	21	..	1,040	138	1,140	12·6

APP. A., No. 1.

Digest of Vaccination Officers' Returns, 1895.

RETURNS, 1895.

—	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-Pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
SURREY (EXTRA METROPOLITAN.)								
Chertsey	923	614	1	..	48	6	254	28·2
Croydon	4,147	2,435	6	..	369	103	1,234	32·2
Dorking	367	309	..	..	15	1	42	11·7
Epsom	1,190	907	7	..	85	21	170	16·1
Farnham	1,678	1,350	3	..	151	10	164	10·4
Godstone	470	376	..	..	34	4	56	12·8
Guildford	1,419	1,021	6	..	132	45	215	18·3
Hambledon	498	439	1	..	39	4	15	3·8
Kingston	3,056	2,385	22	..	243	86	320	13·3
Reigate	871	629	1	..	72	39	130	19·4
Richmond..	1,010	912	2	..	67	1	28	2·9
	15,629	11,377	49	..	1,255	320	2,628	18·9
SUSSEX.								
Battle	493	327	1	..	51	7	107	23·1
Brighton	2,661	2,101	7	..	298	89	166	9·6
Chailey	235	136	2	..	29	8	60	28·9
Chichester .. .. :	182	167	..	..	8	2	5	3·8
Cuckfield	576	492	5	..	38	12	29	7·1
Eastbourne	1,096	210	..	..	119	10	757	70·0
East Grinstead	553	261	..	..	20	1	271	49·2
East Preston	824	693	3	..	69	9	50	7·2
Hailsham	381	303	..	..	29	6	43	13·5
Hastings	1,377	941	5	..	156	5	270	20·0
Horsham	623	523	..	..	40	14	46	9·6
Lewes	285	100	..	..	27	..	158	55·4
Midhurst	345	304	1	..	23	6	11	4·9
Newhaven	289	222	2	..	24	1	40	14·2
Petworth	204	179	1	..	17	..	7	3·4
Rye	302	244	..	..	24	5	29	11·3
Steyning	1,634	1,414	5	..	126	22	67	5·4
Thakeham	197	176	2	..	14	..	5	2·5
Ticehurst	445	356	1	..	28	6	56	13·9
Uckfield	626	309	..	..	55	2	260	41·9
Westbourne	165	133	1	..	14	2	15	10·3
West Firle	58	43	..	..	3	4	8	20·7
Westhampnett	539	453	..	..	45	12	29	7·6
	14,093	10,087	36	..	1,255	223	2,492	19·3
WARWICK.								
Alcester	537	452	..	..	51	7	27	6·3
Aston	9,245	6,543	77	..	1,246	138	1,241	14·9
Atherstone	579	395	..	..	79	..	105	18·1
Birmingham	8,162	6,373	55	..	1,110	32	592	7·6
Coventry	1,629	217	2	..	214	..	1,196	73·4
Foleshill	709	353	..	..	70	..	286	40·3
Meriden	275	220	..	..	21	2	32	12·4
Nuneaton	776	76	..	..	120	..	580	74·7
Rugby	744	183	..	..	64	12	485	66·8
Solihull	892	663	6	..	70	28	125	17·2
Southam	294	222	..	..	31	5	36	13·9
Stratford-on-Avon	512	419	..	..	45	..	48	9·4
Warwick	1,248	1,062	1	..	105	13	67	6·4
	25,602	17,178	141	..	3,226	237	4,820	19·8

——	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-Pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
WESTMORLAND.								
East Ward	317	272	1	..	27	3	14	5·4
Kendal	1,137	1,014	2	..	89	9	23	2·8
West Ward	219	194	..	..	17	.	8	3·7
	1,673	1,480	3	..	133	12	45	3·4
WILTS.								
Amesbury..	172	147	..	..	12	..	13	7·6
Bradford	242	201	..	..	22	..	19	7·9
Calne	223	152	..	..	10	4	57	27·4
Chippenham	606	435	1	..	49	26	95	20·0
Cricklade & Wootton Basset	346	103	..	..	29	6	208	61·8
Devizes	489	329	1	..	23	18	118	27·8
Highworth and Swindon ..	1,633	485	..	..	128	143	877	62·3
Malmesbury	301	244	..	..	25	6	26	10·6
Marlborough	224	204	..	..	14	..	6	2·7
Melksham..	453	79	1	..	35	..	338	74·6
Mere	160	135	..	..	16	4	5	5·6
Pewsey	294	264	..	..	21	3	6	3·1
Salisbury	694	600	..	..	55	14	25	5·6
Tisbury	221	178	..	..	21	14	8	10·0
Warminster	322	266	2	..	25	..	29	9·0
Westbury and Whorwellsdown.	262	194	..	..	15	3	50	20·2
Wilton	270	228	..	..	17	10	15	9·3
	6,912	4,244	5	..	517	251	1,895	31·0
WORCESTER.								
Bromsgrove	968	783	5	..	115	15	50	6·7
Droitwich	516	432	1	..	52	11	20	6·0
Dudley	5,534	4,228	13	..	675	95	523	11·2
Evesham	492	356	1	..	36	4	95	20·1
Kidderminster	1,057	926	7	..	92	7	25	3·0
King's Norton	4,245	2,751	24	..	481	29	960	23·3
Martley	441	385	2	..	35	17	2	4·3
Pershore	365	319	..	..	39	2	5	1·9
Shipston-on-Stour	439	363	1	..	36	8	31	8·9
Stourbridge	3,067	2,676	10	..	308	17	56	2·4
Tenbury	198	160	2	..	16	4	16	10·1
Upton-on-Severn	574	498	..	..	46	5	25	5·2
Worcester	1,397	993	3	..	184	39	178	15·5
	19,293	14,870	69	..	2,115	253	1,986	11·6
YORK, EAST RIDING.								
Beverley	727	596	3	..	77	18	33	7·0
Bridlington	460	280	1	..	54	2	123	27·2
Driffield	507	438	2	..	49	8	10	3·6
Howden	376	315	5	..	43	1	12	3·5
Kingston-upon-Hull	2,655	1,742	12	..	392	5	504	19·0
Patrington	208	161	.	..	23	1	23	11·5
Pocklington	392	334	..	..	44	4	10	3·6
Sculcoates	5,089	3,503	16	..	684	60	826	17·4
Skirlaugh	250	205	..	..	30	5	10	6·0
York	2,570	2.082	14	..	308	46	120	6·5
	13,234	9,656	53	..	1,704	150	1,671	13·8

pp. A., No. 1.

igest of
accination
fficers'
eturns, 1895.

	Returns, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-Pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
YORK, NORTH RIDING.								
Aysgarth	122	100	..	..	13	4	5	7·4
Bedale	235	206	..	..	22	1	6	3·0
Easingwold	236	208	..	..	13	4	11	6·4
Guisborough	1,056	834	7	..	111	8	96	9·8
Helmsley	150	128	1	..	10	7	6	8·7
Kirkby Moorside	150	122	1	..	11	5	11	10·7
Leyburn	155	136	..	..	15	2	2	2·6
Malton	572	445	8	..	56	11	52	11·0
Middlesbrough	4,353	3,512	8	..	543	72	218	6·7
Northallerton	310	281	..	..	21	2	6	2·6
Pickering	323	242	1	..	43	17	20	11·5
Reeth	63	57	1	..	2	..	3	4·8
Richmond	296	259	..	..	25	1	11	4·1
Scarborough	1,274	328	2	..	181	8	755	59·9
Stokesley	289	255	..	..	26	4	4	2·8
Thirsk	335	293	1	..	33	..	8	2·4
Whitby	611	512	..	..	53	23	23	7·5
	10,530	7,916	30	..	1,178	169	1,237	13·4
YORK, WEST RIDING.								
Barnsley	4,407	3,403	32	..	611	21	340	8·2
Bierley, North	3,681	2,271	15	..	475	71	849	25·0
Bradford	5,591	3,159	25	..	904	83	1,420	26·9
Bramley	2,209	1,622	8	..	295	5	279	12·9
Dewsbury	4,546	1,387	19	..	892	93	2,155	49·5
Doncaster	2,586	1,904	27	..	313	85	257	13·2
Ecclesall Bierlow	4,729	3,885	60	..	581	20	183	4·3
Goole	932	709	2	..	110	7	104	11·9
Halifax	4,581	202	6	..	605	..	3,768	82·3
Hemsworth	681	561	..	..	64	7	49	8·2
Holbeck	984	797	2	..	128	14	43	5·8
Huddersfield	3,884	3,384	21	..	371	16	92	2·8
Hunslet	2,641	2,110	9	..	369	44	109	5·8
Keighley	1,849	37	1	..	213	..	1,598	86·4
Knaresborough	790	425	2	..	93	21	249	34·2
Leeds	7,310	5,942	40	..	824	119	385	6·9
Ouseburn, Great	326	291	1	..	26	2	6	2·5
Pateley Bridge	249	213	..	..	21	3	12	6·0
Penistone	488	407	..	..	47	9	25	7·0
Pontefract	2,480	1,979	11	..	302	17	171	7·6
Ripon	420	304	..	..	40	4	72	18·1
Rotherham	3,794	3,084	16	..	390	47	257	8·0
Saddleworth	497	52	..	..	61	..	384	77·3
Sedbergh	84	74	..	..	5	..	5	6·0
Selby	476	403	..	..	51	2	20	4·6
Settle	341	260	1	..	24	5	51	16·4
Sheffield	7,946	6,071	60	..	1,000	40	775	10·3
Skipton	1,217	271	1	..	177	1	767	63·1
Tadcaster	950	808	6	..	93	4	39	4·5
Thorne	456	333	..	..	48	10	65	16·4
Wakefield	3,709	2,995	15	..	434	36	229	7·1
Wetherby	363	304	..	..	29	3	27	8·3
Wharfedale	1,409	981	8	..	137	24	259	20·1
Wortley	1,532	1,213	6	..	155	30	128	10·3
	78,138	51,841	394	..	9,888	843	15,172	20·5

APP. A., N

Digest of Vaccinatio Officers' Returns, 1

	Returns, 1895.							
—	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-Pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
ANGLESEY.								
Anglesey	361	314	..	..	32	2	13	4·2
Holyhead	562	508	..	..	41	3	10	2·3
	923	822	..	..	73	5	23	3·0
BRECKNOCK.								
Brecknock	400	347	..	..	45	4	4	2·0
Builth	204	174	..	..	23	2	5	3·4
Crickhowell	715	576	..	..	77	22	40	8·7
Hay	256	162	..	..	34	..	60	23·4
	1,575	1,259	..	..	179	28	109	8·7
CARDIGAN.								
Aberayron	271	238	..	..	24	2	7	3·3
Aberystwith	448	389	..	..	38	6	15	4·7
Cardigan	358	250	..	..	42	..	66	18·4
Lampeter	214	171	..	..	38	2	3	2·3
Tregaron	185	167	..	..	15	1	2	1·6
	1,476	1,215	..	..	157	11	93	7·0
CARMARTHEN.								
Carmarthen	912	774	..	..	110	9	19	3·1
Llandilo Fawr	707	638	1	..	62	2	4	0·8
Llandovery	292	251	..	..	32	5	4	3·1
Llanelly	1,893	1,551	..	..	217	4	121	6·6
Newcastle-in-Emlyn	467	417	..	..	44	2	4	1·3
	4,271	3,631	1	..	465	22	152	4·1
CARNARVON.								
Bangor and Beaumaris ..	981	858	..	..	88	11	24	3·6
Carnarvon	1,068	838	1	..	137	28	64	8·6
Conway	732	583	2	..	103	1	43	6·0
Pwllheli	507	426	..	..	62	10	9	3·7
	3,288	2,705	3	..	390	50	140	5·8
DENBIGH.								
Llanrwst	296	228	..	..	43	14	11	8·4
Ruthin	291	254	..	..	28	7	2	3·1
Wrexham	2,287	1,983	4	..	229	32	39	3·1
	2,874	2,465	4	..	300	53	52	3·7

PP. A., No. 1

igest of
accination
fficers'
eturns, 1895

	RETURNS, 1895.							
	Births.	Successfully Vaccinated.	Insusceptible of Vaccination.	Had Small-Pox.	Died unvaccinated.	Vaccination postponed.	Remaining.	Children not finally accounted for (including cases postponed), per cent. of births.
FLINT.								
Asaph, St.	710	564	3	..	74	10	59	9·7
Hawarden	521	357	..	..	23	5	136	27·1
Holywell	1,296	1,057	1	..	138	44	56	7·7
	2,527	1,978	4	..	235	59	251	12·3
GLAMORGAN.								
Bridgend and Cowbridge ..	2,106	1,708	..	..	296	47	55	4·8
Cardiff	7,296	5,950	27	..	814	35	470	6·9
Gower	299	244	..	..	18	2	35	12·4
Merthyr Tydfil	4,971	4,095	6	..	645	153	72	4·5
Neath	2,348	2,064	1	..	228	31	24	2·3
Pontardawe	882	781	..	..	81	16	4	2·3
Pontypridd	7,315	5,801	6	..	1,009	67	432	6·8
Swansea	4,165	3,524	2	..	427	7	205	5·1
	29,380	24,167	42	..	3,516	358	1,297	5·6
MERIONETH.								
Bala	144	113	..	..	17	11	3	9·7
Corwen	407	326	1	..	48	18	14	7·9
Dolgelley	340	288	1	..	44	4	3	2·1
Festiniog	829	671	..	..	122	15	21	4·3
	1,720	1,398	2	..	231	48	41	5·2
MONTGOMERY.								
Forden	398	336	..	..	45	5	12	4·3
Llanfyllin	461	399	..	..	41	14	7	4·6
Machynlleth	270	239	..	..	22	2	7	3·3
Newtown and Llanidloes ..	539	453	1	..	54	6	25	5·8
	1,668	1,427	1	..	162	27	51	4·7
PEMBROKE.								
Haverfordwest	919	746	1	..	108	14	50	7·0
Narberth	440	392	..	..	30	4	14	4·1
Pembroke	861	756	..	..	84	9	12	2·4
	2,220	1,894	1	..	222	27	76	4·6
RADNOR.								
Knighton	315	115	..	..	31	3	166	53·7
Rhayader	187	139	..	..	16	..	32	17·1
	502	254	..	..	47	3	198	40·0

No. 2.

INSPECTION OF PUBLIC VACCINATION.

APP. A.—
Inspectio
Public V
cination,
Awards t
Public V
cinators,

LIST (alphapetically arranged) of 312 UNIONS inspected during the Year 1897, with reference to the PROCEEDINGS under the VACCINATION ACTS, 1867 and 1871, and an ACCOUNT of the AWARDS certified by the Board as payable to the respective PUBLIC VACCINATORS out of COUNTY FUNDS.

UNION.	No. of Vaccination Districts in the Union.	No. of Public Vaccinators recommended for Award.	Range of Awards in each Union.		Total Sum awarded in each Union.	Medical Inspector.
			Minimum.	Maximum.		
			£ s. d.	£ s. d.	£ s. d.	
Abingdon	6	4	6 1 0	21 2 0	44 15 0	Dr. Bulstrode.
Alnwick	7	4	1 0 0	4 16 0	9 17 0	„ Fletcher.
Alverstoke	1	1	..	..	39 11 0	„ Bruce Low.
Amersham	6	4	2 8 0	5 10 0	14 4 0	„ Buchanan.
Ampthill	4	4	2 9 0	4 18 0	14 13 0	„ Thomson.
Asaph, St.	5	3	6 13 0	10 17 0	25 0 0	„ Wheaton.
Ashby-de-la-Zouch ..	5	5	2 4 0	6 2 0	23 11 0	„ Buchanan.
Ashford, East	7	5	0 19 0	6 8 0	16 3 0	„ Sweeting.
Ashford, West.. ..	4	4	3 6 0	19 19 0	38 0 0	Do.
Ashton-under-Lyne..	12	6	0 3 0	9 12 0	29 19 0	Dr. Fletcher.
Atcham	7	6	2 0 0	20 4 0	39 8 0	„ Wheaton.
Austell, St.	7	7	1 2 0	17 2 0	38 11 0	Mr. Royle.
Axbridge, ...	11	8	1 7 0	8 2 0	29 7 0	Do.
Aylesbury	8	7	2 5 0	19 10 0	47 11 0	Dr. Buchanan.
Bala	1	1	..	..	6 18 0	Dr. Wheaton.
Bangor and Beaumaris	6	6	5 9 0	15 15 0	52 2 0	Do.
Barrow-in-Furness ..	1	1	..	..	135 9 0	Dr. Fletcher.
Barrow-on-Soar ..	6	..	..	..	..	„ Buchanan.
Barton Regis	6	5	4 5 0	12 8 0	37 18 0	„ Bulstrode.
Barton-upon-Irwell..	7	4	3 8 0	28 15 0	44 8 0	„ Fletcher.
Basford	15	12	1 4 0	38 11 0	180 18 0	„ Mivart.
Bath	5	5	4 8 0	31 8 0	66 8 0	Mr. Royle.
Beaminster	6	2	1 0 0	5 3 0	6 3 0	Dr. Bruce Low.
Bedford	8	7	0 5 0	2 9 0	8 0 0	„ Thomson.
Bedminster	9	6	2 0 0	8 2 0	27 18 0	Mr. Royle.

APP. A.—No. 2.

nspection of
ublic Vac-
ination, and
wards to
ublic Vac-
inators, 1897.

UNION.	No. of Vaccination Districts in the Union.	No. of Public Vaccinators recommended for Award.	Range of Awards in each Union.		Total Sum awarded in each Union.	Medical Inspector.
			Minimum.	Maximum.		
			£ s. d.	£ s. d.	£ s. d.	
Belford	2	2	1 1 0	3 5 0	4 6 0	Dr. Fletcher.
Bellingham	6	1	..	..	1 9 0	Do.
Berwick-on-Tweed ..	3	1	..	..	3 1 0	Do.
Beverley	6	6	1 2 0	17 11 0	27 10 0	Dr. Reece.
Biggleswade	6	5	0 2 0	1 3 0	2 19 0	„ Thomson.
Billesdon ..	3	2	1 4 0	1 6 0	2 10 0	„ Buchanan.
Bingham	4	3	3 4 0	5 0 0	12 19 0	„ Mivart.
Birmingham	1	1	..	..	157 3 0	„ Bruce Low.
Blaby	3	..	..	..	..	„ Buchanan.
Blackburn	10	4	0 6 0	7 17 0	16 7 0	„ Fletcher.
Blandford	5	4	1 13 0	9 1 0	18 13 0	„ Bruce Low.
Blean	4	4	3 3 0	14 6 0	39 16 0	„ Sweeting.
Blything	8	5	2 17 0	6 7 0	23 8 0	„ Copeman.
Bodmin	7	4	2 3 0	6 18 0	17 17 0	Mr. Royle.
Bosmere and Claydon	3	1	..	..	13 9 0	Dr. Copeman.
Bradford (Yorks) ..	4	2	8 1 0	14 5 0	22 6 0	„ Reece.
Bramley	5	4	1 9 0	5 10 0	13 19 0	„ Mivart.
Brecknock	3	3	6 12 0	12 2 0	28 0 0	Do.
Brentford	8	7	7 3 0	30 6 0	130 19 0	Dr. Sweeting.
Bridge	5	5	3 7 0	8 6 0	27 15 0	Do.
Bridgwater	10	9	1 1 0	10 2 0	43 11 0	Dr. Mivart.
Bridgnorth	3	3	2 11 0	12 0 0	19 13 0	„ Wheaton.
Bridlington .. .	4	4	1 11 0	7 0 0	12 11 0	„ Reece.
Bridport..	3	3	2 18 0	15 14 0	21 19 0	„ Bruce Low.
Bristol	1	1	..	..	7 1 0	„ Barry.
Bromley	8	7	2 14 0	15 4 0	52 5 0	„ Sweeting.
Bromyard	3	2	6 3 0	6 14 0	12 17 0	„ Bulstrode.
Buckingham	3	2	5 5 0	7 9 0	12 14 0	„ Buchanan.
Builth	1	1	..	..	18 15 0	„ Mivart.
Bury	6	4	2 19 0	8 17 0	20 16 0	„ Fletcher.
Bury St. Edmunds ..	1	1	..	..	20 3 0	„ Copeman.
Caistor	8	6	0 9 0	4 2 0	15 17 0	„ Bruce Low.
Cambridge	1	1	..	..	49 10 0	„ Thomson.
Camelford	2	1	..	..	5 8 0	Mr. Royle.
Cannock	9	3	0 19 0	7 3 0	13 16 0	Dr. Wheaton.

UNION.	No. of Vaccination Districts in the Union.	No. of Public Vaccinators recommended for Award.	Range of Awards in each Union.		Total Sum awarded in each Union.	Medical Inspector.
			Minimum.	Maximum.		
			£ s. d.	£ s. d.	£ s. d.	
Canterbury	1	1	..	..	23 18 0	Dr. Sweeting.
Carmarthen	6	5	6 19 0	13 19 0	54 7 0	„ Mivart.
Carnarvon	4	3	0 13 0	20 3 0	25 4 0	„ Wheaton.
Castle Ward	7	3	6 7 0	12 14 0	26 1 0	„ Fletcher.
Catherington	1	..	..	..	5 11 0	„ Bruce Low.
Caxton and Arrington	4	4	2 3 0	6 19 0	18 18 0	„ Thomson.
Cerne	3	3	0 17 0	5 18 0	11 15 0	„ Bruce Low.
Chard	8	8	1 5 0	13 9 0	57 19 0	Mr. Royle.
Chelsea	2	1	..	..	26 6 0	Dr. Sweeting.
Cheltenham	3	..	..	..	..	„ Bulstrode.
Chesterton	7	6	6 9 0	11 11 0	47 18 0	Mr. Royle.
Chipping Sodbury ..	5	4	2 9 0	11 12 0	23 18 0	Dr. Bulstrode.
Chorlton	12	9	2 1 0	43 13 0	151 16 0	„ Fletcher.
Christchurch	3	3	8 12 0	16 13 0	34 11 0	„ Bruce Low.
Church Stretton ..	4	4	1 6 0	3 9 0	9 9 0	„ Wheaton.
Cirencester	5	4	0 12 0	10 3 0	22 7 0	„ Bulstrode.
Cleobury Mortimer ..	2	2	6 17 0	7 10 0	14 7 0	„ Wheaton.
Clun	4	2	1 12 0	2 5 0	3 17 0	Do.
Clutton	5	4	5 15 0	24 7 0	50 14 0	Mr. Royle.
Columb, St., Major ..	6	5	2 15 0	4 19 0	19 12 0	Do.
Conway	3	3	10 17 0	15 3 0	40 0 0	Dr. Wheaton.
Corwen	4	2	4 0 0	10 8 0	14 8 0	Do.
Cosford	5	4	5 10 0	7 10 0	26 3 0	Dr. Bulstrode.
Coventry	1	..	..	..	..	„ Barry.
Cranbrook	6	4	3 0 0	8 15 0	21 9 0	„ Sweeting.
Crickhowell	2	2	7 0 0	35 6 0	42 6 0	„ Mivart.
Dartford	6	5	13 12 0	45 19 0	142 14 0	Dr. Sweeting.
Depwade	8	7	0 13 0	3 14 0	14 5 0	„ Copeman.
Dolgelley	5	4	3 11 0	9 16 0	21 18 0	„ Wheaton.
Dorchester	6	5	0 12 0	12 10 0	23 7 0	„ Bruce Low.
Dore	3	1	..	..	3 13 0	„ Bulstrode.
Dover	5	1	..	..	28 11 0	„ Sweeting.
Downham	7	5	1 5 0	4 13 0	16 7 0	„ Copeman.
Drayton	5	5	0 15 0	7 10 0	16 5 0	„ Wheaton.
Driffield	8	7	1 18 0	6 7 0	25 3 0	„ Reece.

UNION.	No. of Vaccination Districts in the Union.	No. of Public Vaccinators recommended for Award.	Range of Awards in each Union. Minimum.	Range of Awards in each Union. Maximum.	Total Sum awarded in each Union.	Medical Inspector.
			£ s. d.	£ s. d.	£ s. d.	
Droitwich	7	5	0 11 0	8 2 0	26 4 0	Dr. Wheaton.
Droxford	4	4	2 19 0	6 9 0	15 15 0	„ Bruce Low.
Dulverton	2	2	1 8 0	10 1 0	11 12 0	„ Mivart.
Dursley	3	3	1 17 0	4 11 0	8 15 0	„ Bulstrode.
East Retford	6	5	2 7 0	16 15 0	37 13 0	Dr. Mivart.
Eastry	7	6	3 19 0	23 10 0	68 5 0	„ Sweeting.
Elham	5	5	0 13 0	38 7 0	62 15 0	Do.
Ellesmere	7	5	1 4 0	4 13 0	14 8 0	Dr. Wheaton.
Ely	6	3	1 15 0	12 0 0	21 16 0	„ Thomson.
Erpingham	3	2	4 7 0	6 11 0	10 18 0	„ Copeman.
Eton	9	5	0 4 0	14 15 0	27 7 0	„ Buchanan.
Exeter	1	1	..	..	25 1 0	„ Barry.
Falmouth	4	3	1 8 0	1 19 0	4 16 0	Mr. Royle.
Fareham	4	3	3 9 0	11 5 0	19 8 0	Dr. Bruce Low.
Faringdon	4	4	1 19 0	12 4 0	27 14 0	„ Bulstrode.
Faversham	4	3	17 17 0	51 14 0	89 8 0	„ Sweeting.
Festiniog	5	3	5 11 0	13 7 0	25 13 0	„ Wheaton.
Fordingbridge ..	2	2	5 10 0	7 10 0	13 0 0	„ Bruce Low
Forehoe	6	5	0 14 0	11 9 0	18 8 0	„ Copeman.
Freebridge Lynn ..	4	2	3 0 0	10 9 0	13 9 0	Do.
Frome	5	5	4 6 0	15 15 0	35 5 0	Mr. Royle.
Gainsborough ..	8	6	1 3 0	2 4 0	9 4 0	Dr. Bruce Low.
George, St., in the East	1	1	..	..	98 0 0	„ Sweeting.
Germans, St.	6	3	2 18 0	7 8 0	16 1 0	Mr. Royle.
Glanford Brigg ..	10	6	1 16 0	12 1 0	41 12 0	Dr. Bruce Low.
Glendale	6	3	0 4 0	3 16 0	5 4 0	„ Fletcher.
Gloucester	2	1	..	..	15 8 0	„ Bulstrode.
Gravesend and Milton	1	1	..	..	16 11 0	„ Sweeting.
Grimsby	4	4	1 4 0	31 4 0	58 2 0	„ Bruce Low.
Guiltcross	5	4	2 10 0	3 13 0	11 18 0	„ Copeman.

UNION.	No. of Vaccination Districts in the Union.	No. of Public Vaccinators recommended for Award.	Range of Awards in each Union.		Total Sum awarded in each Union.	Medical Inspector.
			Minimum.	Maximum.		
			£ s. d.	£ s. d.	£ s. d.	
Halifax	10	2	0 12 0	0 16 0	1 8 0	Dr. Mivart.
Halstead	5	5	2 13 0	11 10 0	34 3 0	„ Copeman.
Haltwhistle	4	4	0 5 0	2 2 0	2 18 0	„ Fletcher.
Hartismere	5	1	..	..	0 10 0	„ Copeman.
Havant	4	4	2 2 0	5 16 0	16 7 0	„ Bruce Low.
Haverfordwest ..	4	4	10 19 0	16 8 0	55 5 0	„ Mivart.
Hawarden	3	1	..	..	8 13 0	„ Wheaton.
Hay	3	3	3 2 0	6 1 0	13 19 0	„ Mivart.
Helston	5	5	5 14 0	9 4 0	34 19 0	Mr. Royle.
Hereford	4	3	7 9 0	27 15 0	44 16 0	Dr. Bulstrode.
Hexham	12	9	0 5 0	6 15 0	19 15 0	„ Fletcher.
Hinckley	4	2	0 14 0	0 15 0	1 9 0	„ Buchanan.
Holbeck	1	1	..	..	11 19 0	„ Reece.
Hollingbourn	6	6	2 4 0	6 6 0	28 9 0	„ Sweeting.
Holywell	4	4	14 19 0	17 16 0	64 17 0	„ Wheaton.
Hoo	1	1	..	..	11 11 0	„ Sweeting.
Horncastle	7	4	1 18 0	3 8 0	10 17 0	„ Bruce Low.
Howden	4	4	2 2 0	8 6 0	18 0 0	„ Reece.
Hoxne	7	4	1 5 0	6 12 0	11 17 0	„ Copeman
Hunslet	4	2	1 13 0	26 2 0	27 15 0	„ Mivart.
Ipswich	1	1	..	..	19 11 0	Dr. Copeman.
Islington	5	5	31 3 0	83 11 0	302 1 0	„ Sweeting.
Keighley	5	3	0 4 0	0 19 0	1 8 0	Dr. Mivart.
Keynsham	6	..	..	..	..	Mr. Royle.
Kidderminster ..	5	5	2 9 0	18 7 0	39 6 0	Dr. Wheaton.
Kings Lynn	1	1	..	..	0 11 0	„ Copeman.
Kingston-on-Hull ..	2	1	..	..	27 7 0	„ Reece.
Kington	5	4	1 18 0	8 13 0	20 1 0	„ Bulstrode.
Knaresborough ..	3	3	1 16 0	9 5 0	20 2 0	„ Mivart.
Lancaster	5	5	1 18 0	54 7 0	84 1 0	Dr. Fletcher.
Langport	6	3	1 14 0	7 10 0	14 1 0	„ Mivart.
Launceston	8	7	2 0 0	6 16 0	27 18 0	Mr. Royle.

APP. A.—No. 2.

Inspection of Public Vaccination, and Awards to Public Vaccinators, 1897.

UNION.	No. of Vaccination Districts in the Union.	No. of Public Vaccinators recommended for Award.	Range of Awards in each Union.		Total Sum awarded in each Union.	Medical Inspector.
			Minimum.	Maximum.		
			£ s. d.	£ s. d.	£ s. d.	
Ledbury	3	3	6 7 0	7 18 0	21 16 0	Dr. Bulstrode.
Leicester	2	..	..	..	..	„ Buchanan.
Leighton Buzzard ..	2	1	..	..	0 9 0	„ Thomson.
Leominster	3	3	1 5 0	15 5 0	23 8 0	„ Bulstrode.
Lewisham	6	4	3 19 0	14 15 0	44 14 0	„ Sweeting.
Lincoln	12	11	1 11 0	5 7 0	34 18 0	„ Bruce Low.
Linton	3	2	8 8 0	10 8 0	18 16 0	„ Thomson.
Liskeard	8	5	1 13 0	7 13 0	25 13 0	Mr. Royle.
Llandilo Fawr ..	5	4	3 3 0	16 4 0	30 18 0	Dr. Mivart.
Llandovery	2	1	..	..	13 8 0	Do.
Llanelly	3	3	25 16 0	105 8 0	160 8 0	Do.
Loddon and Clavering	4	4	5 10 0	7 16 0	26 13 0	Dr. Copeman.
London, City	2	2	4 12 0	10 11 0	15 3 0	„ Sweeting.
Loughborough ..	4	3	0 10 0	1 8 0	2 11 0	„ Buchanan.
Louth	11	10	2 3 0	6 17 0	41 11 0	„ Bruce Low.
Ludlow	5	3	2 2 0	4 16 0	10 8 0	„ Wheaton.
Lunesdale	4	4	0 14 0	7 16 0	14 13 0	„ Fletcher.
Luton	5	2	0 1 0	0 2 0	0 3 0	„ Thomson.
Lutterworth	5	3	1 6 0	6 13 0	10 18 0	„ Buchanan.
Lymington	4	4	2 2 0	7 3 0	18 0 0	„ Bruce Low.
Madeley	4	4	3 14 0	13 18 0	36 19 0	Dr. Wheaton.
Maidstone	5	5	5 0 0	37 18 0	73 6 0	„ Sweeting.
Malling	6	3	8 0 0	15 9 0	35 13 0	Do.
Mansfield	7	4	6 17 0	23 1 0	63 10 0	Dr. Mivart.
Market Bosworth ..	6	5	0 15 0	5 12 0	13 4 0	„ Buchanan.
Martley	7	7	0 4 0	9 11 0	28 4 0	„ Wheaton.
Marylebone	2	2	81 9 0	93 10 0	174 19 0	„ Sweeting.
Medway	3	2	38 1 0	68 17 0	106 18 0	Do.
Melton Mowbray ..	7	6	0 7 0	1 18 0	5 5 0	Dr. Buchanan.
Mildenhall	2	1	..	..	11 10 0	„ Bulstrode.
Mile End Old Town..	2	2	21 6 0	51 0 0	72 6 0	„ Sweeting.
Milton	2	2	20 7 0	45 17 0	66 4 0	Do.
Mitford and Launditch.	8	5	4 4 0	6 19 0	30 1 0	Dr. Copeman.
Morpeth	9	1	..	..	0 17 0	„ Fletcher.
Mutford and Lothingland.	3	3	2 9 0	33 2 0	48 2 0	„ Copeman.

APP. A.- No.

Inspection of Public Vaccination, and Awards to Public Vaccinators, 1897

UNION.	No. of Vaccination Districts in the Union.	No. of Public Vaccinators recommended for Award.	Range of Awards in each Union.		Total Sum awarded in each Union.	Medical Inspector.
			Minimum.	Maximum.		
			£ s. d.	£ s. d.	£ s. d.	
Nantwich	7	5	3 14 0	15 0 0	32 3 0	Dr. Wheaton.
Narberth	4	4	9 17 0	12 16 0	46 6 0	„ Mivart.
Newark	8	7	0 11 0	30 1 0	46 0 0	Do.
Newcastle-in-Emlyn	3	3	11 11 0	18 17 0	46 6 0	Do.
Newcastle-under-Lyme.	3	3	0 2 0	46 15 0	83 10 0	Dr. Wheaton.
Newcastle-on-Tyne	3	4	34 16 0	101 14 0	230 7 0	„ Bruce Low.
Newent	3	3	5 4 0	5 18 0	16 12 0	„ Bulstrode.
New Forest	5	3	2 16 0	14 5 0	21 10 0	„ Bruce Low.
Newmarket	8	5	6 15 0	24 8 0	58 15 0	„ Thomson.
Newport (Salop)	4	4	3 15 0	6 3 0	19 0 0	„ Wheaton.
Newport Pagnell	10	6	1 9 0	11 1 0	37 13 0	„ Buchanan.
North Bierley	15	7	3 9 0	14 3 0	53 4 0	„ Reece.
Northleach	5	5	1 4 0	4 19 0	14 17 0	„ Bulstrode.
North Witchford	7	2	6 16 0	9 17 0	16 13 0	Mr. Royle.
Nottingham	3	3	12 13 0	23 13 0	58 13 0	Dr. Mivart.
Oldham	6	1	..	..	1 7 0	Dr. Fletcher.
Ormskirk	9	8	4 5 0	36 2 0	89 4 0	Do.
Oswestry	5	4	2 4 0	16 2 0	33 3 0	Dr. Wheaton.
Ouseburn, Great	4	2	1 17 0	2 19 0	4 16 0	„ Reece.
Pateley Bridge	2	1	..	..	5 9 0	Dr. Reece.
Patrington	5	5	0 7 0	3 12 0	6 19 0	Do.
Pembroke	6	5	4 6 0	18 7 0	47 16 0	Dr. Mivart.
Penzance	5	5	5 1 0	24 10 0	72 17 0	Mr. Royle.
Petersfield	4	4	2 17 0	7 10 0	19 6 0	Dr. Bruce Low.
Plomesgate	6	5	3 15 0	7 1 0	27 2 0	„ Copeman.
Pocklington	6	4	2 4 0	4 14 0	12 6 0	„ Reece.
Poole	4	4	2 9 0	14 15 0	24 2 0	„ Bruce Low.
Portsea Island	1	1	..	..	75 10 0	Do.
Prescot	7	6	9 7 0	102 1 0	331 11 0	Dr. Fletcher.
Prestwich	7	7	1 14 0	67 2 0	184 16 0	Do.
Pwllheli	6	4	4 13 0	8 5 0	26 12 0	Dr. Wheaton.

APP. A.—No. 2.

Inspection of Public Vaccination, and Awards to Public Vaccinators, 1897.

UNION.	No. of Vaccination Districts in the Union.	No. of Public Vaccinators recommended for Award.	Range of Awards in each Union.		Total Sum awarded in each Union.	Medical Inspector.
			Minimum.	Maximum.		
			£ s. d.	£ s. d.	£ s. d.	
Redruth..	6	5	2 8 0	24 13 0	54 5 0	Mr. Royle.
Ringwood	1	1	..	..	11 16 0	Dr. Bruce Low.
Ripon	4	3	2 9 0	10 1 0	16 9 0	„ Mivart.
Risbridge	5	4	3 16 0	12 18 0	27 6 0	„ Bulstrode.
Rochdale	6	2	1 8 0	1 14 0	3 2 0	„ Fletcher.
Romford	6	6	1 2 0	20 12 0	59 5 0	Mr. Royle.
Romney Marsh ..	3	3	0 18 0	7 15 0	14 17 0	Dr. Sweeting.
Ross	6	2	3 7 0	16 1 0	19 8 0	„ Bulstrode.
Rothbury	6	1	..	..	2 7 0	„ Fletcher.
Saffron Walden ..	6	3	0 16 0	5 1 0	7 5 0	Mr. Royle.
Samford..	4	4	2 14 0	8 13 0	21 18 0	Dr. Bulstrode.
Sculcoates	6	5	2 3 0	86 8 0	194 11 0	„ Reece.
Sedburgh	3	..	..	..	..	Do.
Seisdon	4	4	2 8 0	4 19 0	15 2 0	Dr. Wheaton.
Settle	4	3	0 18 0	9 0 0	12 14 0	„ Reece.
Sevenoaks	6	5	4 17 0	13 10 0	49 10 0	„ Sweeting.
Shaftesbury	4	1	..	..	8 19 0	„ Bruce Low
Sheppey..	2	2	9 0 0	17 6 0	23 6 0	„ Sweeting.
Shepton Mallet ..	5	4	2 2 0	11 12 0	25 2 0	Mr. Royle.
Sherborne	3	3	2 19 0	7 14 0	15 15 0	Dr. Bruce Low.
Shifnal	4	3	3 4 0	5 6 0	12 19 0	„ Wheaton.
Skipton	8	6	0 10 0	3 3 0	7 13 0	„ Dr. Reece.
Skirlaugh	5	4	1 11 0	6 2 0	12 19 0	Do.
Smallburgh	4	2	3 10 0	5 4 0	8 14 0	Dr. Copeman.
Southampton	2	1	..	..	46 2 0	„ Bruce Low.
South Stoneham ..	6	6	4 11 0	20 2 0	65 4 0	Do.
Southwell	7	7	1 2 0	5 16 0	21 11 0	Dr. Mivart.
Spilsby	7	5	4 0 0	5 11 0	23 19 0	„ Bruce Low.
Stafford	4	2	14 11 0	14 13 0	29 4 0	„ Wheaton.
Staines	6	5	3 6 0	10 0 0	35 1 0	„ Sweeting.
Stone	4	4	2 2 0	15 9 0	33 9 0	„ Wheaton.
Stow	8	5	4 16 0	8 7 0	28 1 0	„ Bulstrode.
Stow-on-the-Wold ..	2	1	..	..	6 7 0	Do.
Stratton..	2	1	..	..	9 9 0	Mr. Royle.
Strood	2	2	30 0 0	41 19 0	71 19 0	Dr. Sweeting.

UNION.	No. of Vaccination Districts in the Union.	No. of Public Vaccinators recommended for Award.	Range of Awards in each Union. Minimum.	Range of Awards in each Union. Maximum.	Total Sum awarded in each Union.	Medical Inspector.
			£ s. d.	£ s. d.	£ s. d.	
Stroud	6	5	0 18 0	2 18 0	8 9 0	Dr. Bulstrode.
Sturminster	4	4	2 6 0	6 16 0	15 0 0	„ Bruce Low.
Sudbury	7	6	1 0 0	15 5 0	47 15 0	„ Bulstrode.
Swaffham	5	4	1 6 0	6 17 0	14 13 0	„ Copeman.
Taunton..	7	6	3 0 0	11 9 0	44 10 0	Dr. Mivart.
Tenterden	6	4	0 7 0	6 18 0	14 5 0	„ Sweeting.
Tetbury..	2	2	3 0 0	4 14 0	7 14 0	„ Bulstrode.
Tewkesbury	4	..	..	..	..	Do.
Thanet, Isle of ..	4	3	7 15 0	43 15 0	61 8 0	Dr. Sweeting.
Thetford	6	6	1 0 0	8 0 0	29 7 0	„ Copeman.
Thingoe	8	7	1 6 0	8 2 0	28 10 0	„ Bulstrode.
Thornbury	4	2	1 9 0	6 6 0	7 15 0	Do.
Todmorden	3	2	0 18 0	2 3 0	3 1 0	Dr. Reece.
Tonbridge	6	4	4 4 0	13 1 0	31 4 0	„ Sweeting.
Toxteth Park	2	2	21 11 0	22 19 0	44 10 0	„ Barry.
Truro	7	4	0 13 0	12 10 0	24 1 0	Mr. Royle.
Tynemouth	7	3	13 11 0	21 5 0	50 16 0	Dr. Fletcher
Ulverston	7	5	4 3 0	42 13 0	85 9 0	Dr. Fletcher.
Upton-on-Severn ..	6	4	4 17 0	14 12 0	35 2 0	„ Wheaton.
Uxbridge	7	5	2 18 0	17 17 0	45 0 0	„ Sweeting.
Wallingford	3	1	..	..	14 3 0	Dr. Bulstrode.
Walsall	4	4	5 1 0	25 19 0	47 15 0	„ Wheaton.
Wandsworth and Clapham.	9	6	7 18 0	59 13 0	187 12 0	„ Sweeting.
Wangford	2	1	..	..	5 13 0	„ Copeman.
Wareham and Purbeck.	7	4	3 9 0	8 2 0	20 16 0	„ Bruce Low.
Wellington (Salop) ..	3	3	2 0 0	6 3 0	14 5 0	„ Wheaton.
Wellington (Som.) ..	6	3	4 12 0	6 11 0	15 17 0	„ Mivart.
Wells	4	4	4 17 0	13 15 0	38 6 0	Mr. Royle.
Wem	4	3	1 5 0	5 3 0	9 10 0	Dr. Wheaton.
Weobley	3	2	3 7 0	4 10 0	7 17 0	„ Bulstrode.
West Bromwich ..	5	5	0 7 0	21 0 0	56 11 0	„ Wheaton.
Westbury-on-Severn	5	1	..	..	4 0 0	„ Bulstrode.

APP. A.—No. 2.

Inspection of Public Vaccination, and Awards to Public Vaccinators, 1897.

UNION.	No. of Vaccination Districts in the Union.	No. of Public Vaccinators recommended for Award.	Range of Awards in each Union.		Total Sum awarded in each Union.	Medical Inspector.
			Minimum.	Maximum.		
			£ s. d.	£ s. d.	£ s. d.	
Wetherby	6	1	..	..	0 16 0	Dr. Reece.
Weymouth	6	5	1 4 0	9 0 0	24 17 0	„ Bruce Low.
Wharfedale	4	2	2 10 0	5 2 0	7 12 0	„ Reece.
Wheatenhurst.. ..	2	1	..	..	3 11 0	„ Bulstrode.
Whitchurch (Salop)	3	3	1 3 0	7 8 0	11 18 0	„ Wheaton.
Whittlesey	2	1	..	..	4 2 0	Mr. Royle.
Wight, Isle of	9	7	1 12 0	18 2 0	66 5 0	Dr. Bruce Low.
Williton	7	6	1 10 0	13 17 0	34 2 0	„ Mivart.
Wimborne and Cranborne.	4	3	7 10 0	8 19 0	24 11 0	„ Bruce Low.
Wincanton	6	5	3 6 0	8 9 0	29 7 0	Mr. Royle.
Winchcomb	2	2	5 9 0	8 16 0	14 5 0	Dr. Bulstrode.
Winslow	3	1	..	..	2 5 0	„ Buchanan.
Wisbech	14	6	1 17 0	17 15 0	34 11 0	Mr. Royle.
Woburn	2	2	1 7 0	5 2 0	6 9 0	Dr. Thomson.
Wolverhampton ..	5	2	3 17 0	17 18 0	21 15 0	„ Wheaton.
Woodbridge	4	4	6 5 0	12 14 0	35 17 0	„ Copeman.
Woolwich	4	3	4 15 0	31 4 0	58 14 0	„ Sweeting.
Worcester	1	1	..	..	15 0 0	„ Wheaton.
Worksop	7	7	1 3 0	33 7 0	73 4 0	„ Mivart.
Wycombe	10	8	1 0 0	10 18 0	41 6 0	„ Buchanan.
Yeovil	7	6	3 3 0	20 11 0	51 7 0	Mr. Royle.
York	9	8	0 3 0	85 13 0	98 4 0	Dr. Reece.
Totals	1,553	1,136	..	..	10,460 5 0	

No. 3.

STATISTICS OF THE NATIONAL VACCINE ESTABLISHMENT AND EDUCATIONAL VACCINATION STATIONS.

APP. A.--No. 3.

National Vaccine Establishment, 1897.

I.—STAFF AT END OF 1897.

N.B.—The Stations named in *italics* are Educational Vaccination Stations authorized by the Local Government Board.

Description of Vaccinator.	Name of Vaccinator.	Vaccination Stations.	Days and Hours of Attendance.
Vaccinators supplying lymph for the public service and salaried from the Parliamentary grant.	1. Dr. R. Cory... ...	*Surrey Chapel..*	Tues., Thurs.; 2.
	2. Mr. Joseph Loane ...	*Tottenham Court Road.*	Mon., Wed; 1.
Parochial and other Vaccinators not salaried from the Parliamentary grant, but contributing lymph at a fixed rate of payment.	1. Dr. A. C. Clarke ...	*Salford* ...	Thursday; 2.
	2. Dr. Edmund Robinson	*Birmingham...*	Tuesday; 11.
	3. Mr. N. E. Roberts ..	*Liverpool* ...	Tuesday; 1.
	4. Dr. A. E. Cope ...	*Westminster* ...	Monday; 10.
	5-6. Mr. E. C. Greenwood	*Marylebone*	Tuesday; 2. Wednesday; 10.
	7. Mr. J. Loane ...	*Whitechapel* ...	Wednesday; 11.
	8. Mr. Frederick Holmes	*Leeds*	Tuesday; 2.30.
	9. Dr. Edward Lynes...	Coventry ...	Tuesday; 12.
	10-11. Mr. R. H. Henderson.	*Glasgow* ...	Monday; 12. (Women). Thursday; 12. (Men).
	12. Mr. J. F. Staines ...	*Endell Street...*	Tuesday; 10.
	13. Mr. W. Skinner ...	*Sheffield* ...	Tuesday; 3.
	14. Dr. G. A. Miskin ...	Waterloo ...	Tuesday; 2.
	15. Dr. J. B. Buist ...	*Edinburgh* ...	Thursday; 3.
	16. Mr. F. Cadell ...	*Edinburgh* ...	Tuesday; 12.
	17. Dr. R. Cory... ...	*St. Thomas's Hospital.*	Wednes.; 11.30.
	18. Mr. J. W. Nicol ...	*Glasgow, West.*	Monday; 12.
	19. Dr. William A. Budd	*Exeter* ...	Thursday; 3.
	20. Mr. R. G. McKerron	*Aberdeen* ...	Wednes.; 2.30.
	21. Mr. J. Ll. Treharne	*Cardiff* ...	Tuesday; 11.
Teachers of Vaccination not supplying lymph.	Dr. W. Husband ...	*Edinburgh* ...	Wed., Sat.: 12.
	Mr. G. S. Page ...	*Bristol* ...	Wednesday; 10.
	Mr. V. A. Jaynes ...	*Horsleydown...*	Wednesday; 3.
	Dr. A. N. Montgomery	*Dublin* ...	Tues., Fri.; 10.
	Dr. R. Cory... ...	*Cambridge* ...	Friday; 11.

APP. A.—No. 3.

National Vaccine Establishment, 1897.

II.—ANIMAL VACCINE STATION.

The Animal Vaccine Station is at 95, Lamb's Conduit Street, where Dr. R. Cory and Mr. T. S. Stott attend for the Vaccination of Children on Tuesdays and Thursdays, at 10.30 A.M.

III.—SOURCES AND AMOUNT OF LYMPH SUPPLY IN 1897.

N.B.—The Stations named in *italics* are Educational Vaccination Stations authorized by the Local Government Board.

Description of Vaccinator.	Vaccination Stations.	Number of Vaccinations performed at the Stations respectively.		Number of Charges of Lymph supplied from the Stations respectively.	
		Primary.	Re-vaccinations.	Charged Ivory Points.	Charged Tubes, each estimated as equal to 10 Ivory Points.
Vaccinators salaried from the Parliamentary grant.	1. *Surrey Chapel* ...	129	17	—	—
	2. *Tottenham Court Chapel.*	297	1	—	88
		426	18	—	88
Parochial and other Vaccinators not salaried from the Parliamentary grant, but contributing lymph at a fixed rate of payment.	1. *Salford*	90	—	—	—
	2. *Birmingham* ...	3,251	118	—	450
	3. *Liverpool* ...	494	16	—	—
	4. *Newcastle-on-Tyne.**	261	4	—	4
	5. *Westminster* ...	579	4	—	6
	6–7. *Marylebone* ...	934	4	—	—
	8. *Whitechapel* ...	1,756	—	—	799
	9. *Leeds*	659	2	—	—
	10. Coventry ...	33	2	—	—
	11–12. *Glasgow* ...	621	3	—	21
	13. *Endell Street* ...	101	1	—	5
	14. *Sheffield* ...	406	1	—	—
	15. Waterloo ...	1,150	1	—	1,796
	16. *Edinburgh* ...	304	—	—	—
	17. *Edinburgh* ...	563	1	—	318
	18. *St. Thomas's Hospital.*	163	5	—	—
	19. *Glasgow, West*...	438	7	—	—
	20. *Exeter*	449	11	—	—
	21. *Aberdeen* ...	279	—	—	—
	22. *Cardiff*	1,053	1	—	2
	Total	13,584	181	—	3,401
	Grand Total ...	14,010	199	—	3,489

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* For seven months only.

III.—SOURCES AND AMOUNT OF LYMPH—*continued.*

During the year additional supplies (to the extent of 2,848 charged tubes) were obtained from the following gentlemen:—

Mr. J. Bark, Kirkdale.
„ A. Meeson, Toxteth Park.
Dr. G. A. Miskin, Kennington.

IV.—DISTRIBUTION OF HUMAN LYMPH, 1897.

Number of applications:—	
From Medical Practitioners in England and Wales	2,412
„ „ „ Scotland	63
„ the Navy	38
„ India and the Colonies	34
„ Diplomatic and other Foreign Services	10
Supplies sent out:—	
Charged capillary tubes	5,061

V.—DISTRIBUTION OF CALF LYMPH, 1897.

Number of applications	1,973
Supplies received:—	
Charged ivory points	14,024
„ capillary tubes	575
Supplies sent out:—	
Charged ivory points	13,798
„ capillary tubes	570

No. 4.

PP. A.—No. 4.

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tablishment,
97–98; by
. Cory.

REPORT on the OPERATIONS of the ANIMAL VACCINE STATION at LAMB'S CONDUIT STREET during the Year 1897–98; by DR. CORY.

During the year, 1st April, 1897, to 31st March, 1898, 279 calves were received at Lamb's Conduit Street. Of these, 259 (224 males, 35 females) were vaccinated for the purposes of the station. One was returned to the contractor as unfit for vaccination purposes, and other 19 were used by Dr. Blaxall.

The aggregate weight on reception at Lamb's Conduit Street, of the 259 calves was—of 224 males, 72,356 lbs.; and of 35 females, 11,529 lbs. On dismissal from the station their aggregate weights were respectively 78,379 lbs. and 12,446 lbs., so that during retention for vaccination purposes calves of both sexes gained considerably in weight, males by an average of 26.89 lbs., females by an average of 26.2 lbs.

Of the above calves 257 were vaccinated with lymph directly derived from other calves, and, as usual, proved much more successful than vaccinations performed with stored calf lymph, though it must be stated that only 2 calves were so vaccinated. Insertions, to the number of 18,491, in 257 calf-to-calf operations produced 17,643 vesicles; whereas 135 insertions in the 2 calves produced only 72 vesicles; rates of insertion success respectively of 95.41 and 53.3 per cent. No material differences in the results of calf-to-calf vaccinations were observed, whether the lymph used was from calves vaccinated 96 or from calves vaccinated 120 hours previously.

Primary Vaccinations.—During the year 5,693 persons received primary vaccination at the station, five separate insertions of lymph being made in each instance. Of these persons, 2,825 were males, and 2,868 females; and in 5,232 instances the calf lymph used was transferred direct from calf to arm. All but 23 of the primary vaccinations so performed succeeded at the first attempt, and in no case was a third trial at vaccination requisite; the amount of insertion success obtained by each of three several operators was as follows:— Of 314 persons primarily vaccinated by Mr. Stott, two failed to return for inspection; of the remaining 312, 202 were, on examination, found to have taken in five places, 42 in four, 32 in three, 18 in two, 10 in one place, and 8 were not successful on the first attempt. Mr. Stott's insertion success rate therefore was 84.62 per cent.

Of 397 persons primarily vaccinated by Dr. Savory, acting for Mr. Stott or myself in the absence of one or other of us, 4 failed to return for inspection. Of the 393 remaining, 326 were found to have taken in five places, 23 in four, 20 in three, 12 in two, 8 in one place, and 4 were not successful on the first attempt. Dr. Savory's success rate therefore was 92.32 per cent.

Of 4,509 persons primarily vaccinated by myself, 65 who failed to return for inspection and other 9, all of whom were operated on for the cure of nævi, are not taken into account in these statistics. Of the 4,435 remaining, 4,111 were found to have taken in five places, 211 in four, 34 in three, 41 in two, 28 in one place, while in 10 cases vaccination proved unsuccessful on the first attempt. An insertion success rate of 97.46 per cent.

Twelve persons were primarily vaccinated by students, one case proved unsuccessful on the first attempt, and their insertion success rate was 90 per cent.

Revaccinations.—These during the year numbered 643. Mr. Stott performed 12, Dr. Savory performed 84, students performed 37, and I performed 510. Of these latter, 7 did not return for inspection; and of the 503 remaining, 424 were successful in 5 places, 45 in four, 13 in three, 11 in two, 3 in one place; and 7 were unsuccessful on first attempt. My insertion success rate therefore in revaccinations was 94 per cent. Mr. Stott's success rate among his 12 cases was 100 per cent., and that of Dr. Savory 96.2 per cent., as regards his 84 cases.

In all, 48 cases returned to the station after "inspection" on account of some abnormal course of their vaccinations. In the vast majority of cases this abnormality consisted of sore arm, which was almost invariably the result of ignorant treatment of the vesicle or of the scab. For the rest, there were 5 cases of transient eruption, 5 cases of undue enlargement of axillary glands, 4 of which suppurated; all these cases followed sore arm.

One fatal case of erysipelas following vaccination was the subject of a Coroner's inquest and of inquiry by a Medical Inspector of the Board. The case was that of A. F. L———, of Kennington, aged 4 months. The child was vaccinated on the 3rd of February, 1898, from calf 4,308, there being altogether 43 persons vaccinated from the same calf. No complaint was received from 41 of these, and one only returned on the 22nd. March with a confluent scab, which readily healed on the application of a bread poultice, followed by zinc ointment. A. F. L——— died on the 7th of March of erysipelas. I inspected the body the day after death. There were bullæ on the left fore-arm, but the axillary glands were not enlarged. The erysipelas appeared shortly after the medical attendant had removed the scab, which, I was informed by the mother, he did on the 1st of March, 26 days after vaccination.

No. 5.

APP. A. No. 5.

Abstract of Medical Inspections.

ABSTRACT of MEDICAL INSPECTIONS made in 1897 with regard to the INCIDENCE of DISEASE on particular places, and to questions concerning LOCAL SANITARY ADMINISTRATION.

1. ALDBROUGH (EAST RIDING); population, 666; Dr. Reece.

Authority concerned: Skirlaugh Rural District Council.

Ground of Inquiry: Prevalence of "fever"; local complaints.

Chief Facts reported by Inspector: Differing opinions as to precise nature of disease, which was locally regarded both as "Russian influenza" and "enteric fever." First person attacked lived on highest point of ground in the village; source of infection not traced. Nine houses invaded, 28 persons attacked, and one died. Also a visitor to an invaded house, developed a similar disease on her return home, and she died. The clinical symptoms point to enteric fever.

Water of three wells submitted to the Public Analyst of Hull and the East Riding, who advised the discontinuance of the use of the water. All three wells still in use at the date of inquiry some months after the date of the analyst's report.

Wells, dry steined surface wells sunk in gravel capping the clay. Houses invaded, subsequently to that first attacked, at varying intervals, the disease-prevalence being extended over a year. The order in which these houses were successively attacked followed the direction in which the underground water may be expected to travel from the first house invaded, which was moreover not free from the disease for a period of at least five months.

A leaking cesspool at the first house invaded received slop-drainage from the dwelling. The contents of the cesspool used on the adjoining garden for manure, as also the contents of the boghole privy. The well is 5 feet from the cesspool and 15 yards from the privy. Similar sanitary defects throughout the village.

No hospital provision or disinfecting apparatus. Scavenging left to occupiers. Infectious Disease (Notification) Act not adopted. Local drainage of unglazed and unsocketed pipes, puddled with clay at the joints.

2. BEWDLEY (WORCESTERSHIRE); population (1891), 2,876; Dr. Theodore Thomson.

Authority concerned: Bewdley Town Council.

Ground of Inquiry: Representation by the Worcestershire County Council, under Section 19 of the Local Government Act, 1888, that the Bewdley Town Council had failed to put in force their powers under the Public Health Act.

Chief Facts reported by Inspector: The water-supply of the Borough bad in quality and insufficient in quantity. The sewerage of the district defective. Many unhealthy conditions in connection with dwellings inhabited by the poorer classes. House and yard drainage and paving of yards frequently defective. Disposal and removal of excreta and house refuse unsatisfactory.

3. BRIGHTLINGSEA AND SEVERAL URBAN AND RURAL SANITARY DISTRICTS (ESSEX AND SUFFOLK); Dr. Buchanan.

Ground of Inquiry: Information from the Medical Officers of Health for certain districts in East Essex as to recent cases of enteric fever suspected to be due to eating specifically polluted oysters.

Chief Facts reported by Inspector: Inquiries made as to a total of 26 enteric fever cases, occurring during summer and autumn of 1897 in Urban Districts of Clacton, Walton-on-the-Naze, Haverhill, and Braintree, and Rural Districts of Lexden and Winstree and Tendring. Each of these cases undoubtedly enteric fever; each ascertained to have been that of a person who had partaken of oysters at a date antecedent to illness consistent with occasion of oyster eating having been occasion of infection; in each no conditions, irrespective of oysters, to which infection could be attributed.

All oysters in question had been obtained from oyster vendors at Clacton-on-Sea, Walton-on-the-Naze, or at St. Osyth village. Vendors traced. Ascertained that in all instances but one, implicated oysters could be affirmed almost with certainty to have come from layings at Brightlingsea. Oysters implicated in respect of 20 cases could be definitely referred to one or other of three Brightlingsea oyster merchants. Layings of these three merchants in each instance on a foreshore in Brightlingsea Creek conspicuously exposed to pollution by sewage of Brightlingsea, which is discharged untreated into the Creek. Further ascertained that at sundry different periods during 1897, infectious matters from enteric fever cases in Brightlingsea must needs have been discharged from Brightlingsea sewer outfalls.

4. BURY CORPORATION WATER SUPPLY GATHERING GROUNDS (LANCASHIRE); Dr. Bruce Low.

Authorities concerned: The Corporations of Bury, Haslingden, and Rawtenstall; the Urban District Councils of Ramsbottom, Little Lever, Prestwich, Radcliffe, and Whitfield; and the Rural District Council of Bury.

Ground of Inquiry: Local complaints and reports of Medical Officers of Health regarding the quality of the Public Water Service.

Chief Facts reported by Inspector: Bury Corporation supplies, wholly or in part, 8 sanitary districts in addition to the Borough of Bury, comprising a total population of nearly 160,000. Water obtained from 6 gathering grounds. The supply consists of upland surface water, supplemented by springs, and is delivered without filtration on the constant system. Total capacity of reservoirs, when full, 813 million gallons, sufficient for at least 170 days' supply. Water at present supplied by Bury Corporation liable to specific pollution, and, under existing conditions, not to be regarded as other than dangerous to those who have to use it. Water from housetaps often muddy; sometimes contains minnows, newts, water-fleas, &c. Microscopically found to contain fresh water algæ, rotiferæ, diatomaceæ, also trematode and nematode worms. Some of gathering grounds exposed to gross pollution; in one instance tub closet filth in considerable quantity spread on fields sloping to reservoir and its feeders. In 5 out of the 6 gathering grounds, grassy slopes manured with midden privy contents once or twice yearly. Some streams flowing to reservoirs receive sewage. Reservoirs and gathering grounds insufficiently protected from trespassers. Bury Corporation, which is unwilling to provide sand filtration on the score of expense, seeks to obtain possession of gathering grounds by compulsory purchase, and to then reduce the population on the catchment areas and to control sources of pollution.

5. Chipping Norton Rural District (Oxfordshire); population (1891), 12,664; Dr. Fletcher.

Authority concerned: Chipping Norton Rural District Council.

Ground of Inquiry: Diphtheria; and inadequate Reports of the Medical Officer of Health.

Chief Facts reported by Inspector: Prevalence of diphtheria during 1896 and 1897 at Shipton-under-Wychwood and Milton; outbreaks also at Ascott, Chadlington, Fifield, Idbury, and Bowle. Suspicion of the first case having been imported, early in 1896, from Ealing. Spread of infection and persistency of the disease due to personal infection either at schools, or through inter-visiting. Disinfection of dwellings ascertained to be infected. No isolation hospital. Little trouble taken to trace out cases of suspicious throat-illness; attention mainly devoted to notified cases. Attendance at school of patients from definitely infected dwellings forbidden. Water-supply of Shipton, Milton, and Fifield adequate as regards quantity. Drainage of some sort generally provided, but no proper sewage. Excrement disposal mainly by cesspit-privies. Some overcrowding due to insufficient house accommodation at Shipton.

6. Droylsden (Lancashire); population (1891), 9,481; Dr. Fletcher.

Authority concerned: Droylsden Urban District Council.

Ground of Inquiry: Proposal to rescind Compulsory Notification of Measles.

Chief Facts reported by Inspector: On an application to the Board by the Droylsden Urban District Council, during March, 1897, for sanction to add measles to the list of notifiable diseases, the Board sanctioned such addition on the condition that it should not be revoked within five years. In these circumstances compulsory notification of measles came into force legally on June 1st, 1897; but in practice the diseases commenced to be notified on May 1st, 1897. On August 5th of the same year, however, the District Council informed the Board that they desired to rescind the resolution making measles compulsorily notifiable. Local inquiry showed that notification of measles having been adopted during the course of a widespread epidemic of the disease, had proved more costly than was anticipated; the advantage of early information of first cases having been meanwhile lost. Nevertheless, there were indications of profit having been derived from the compulsory notification of the disease, though the information so derived had not been fully utilized, other sources of information being neglected, and isolation not resorted to. District Council advised to retain notification of measles in order to give the system a fuller and fairer trial.

7. EATON BRAY (BEDS.); population (1891), 1,330; Dr. Wheaton.

Authority concerned: Eaton Bray Rural District Council.

Ground of Inquiry: Representation from Bedfordshire County Council to the effect that the Public Health Act (1875) was not properly enforced in the district.

Chief Facts reported by Inspector: Water Supply derived almost entirely from wells, dry-steined, and sunk in yards or gardens; the water furnished by them liable to pollution by surface washings, and by leakage from uncemented privy vaults and from defective house drains. No sewers except a short length of pipe drain, unventilated and unprovided with means of flushing. Slop-water and liquid refuse discharged into highway drains, or into ditches and other watercourses. Pollution of River Ouzel by untreated sewage. Much nuisance from discharge of sewage into roadside ditches. House drainage unsatisfactory. Excrement disposal by vault privies with uncemented receptacles, and by pail privies. The scavenging of pail privies performed by a contractor; that of vault privies left to householders and very inefficiently carried out.

8. GREAT OUSEBURN RURAL DISTRICT (YORKS); population, 6,375; Dr. Wheaton.

Authority concerned: Great Ouseburn Rural District Council.

Ground of Inquiry: Proposed reappointment of a plurality of Medical Officers of Health for the District; and sanitary administration.

Chief Facts reported by Inspector: The district has an area of 40,934 acres. The water supply, except that of the village of Acomb, which is supplied from the York Waterworks, unsatisfactory. Water obtained from draw-wells, pumps, and dip wells. The wells not protected externally, and frequently so situated that the risks of pollution of the water are very great.

Sewerage: The majority of the villages unsewered. Sewage discharged into watercourses without previous purification, except at Acomb, where is a sewage farm. House drainage satisfactory in some villages, unsatisfactory in others. Excrement disposal effected by midden privies; frequently uncovered, and allowing escape of their contents into the surrounding soil. No public scavenging. Accumulations of privy filth, a cause of great nuisance in many villages. Slaughter houses registered, condition variable. Cowsheds and dairies registered, condition for the most part good. No hospital provision, no disinfecting apparatus. Unsatisfactory results of appointment of two inadequately remunerated Medical Officers of Health, neither living in a central position for his district, and neither giving sufficient time to his duties.

9. HAYLE (CORNWALL); population (1891), 1,172; Dr. Mivart.

Authority concerned: Hayle Urban District Council.

Ground of Inquiry: General sanitary circumstances; local complaints.

Chief Facts reported by Inspector: Hayle town in part coterminous with and in many ways closely connected to the Phillack Urban District.

Water supply, obtained from gathering ground in Phillack Urban District, insufficient in quantity, and liable to dangerous contamination. Provision for storing this water defective.

House accommodation not satisfactory.

No isolation hospital or disinfecting apparatus.

Infectious Disease (Prevention) Act, 1890, and Public Health Acts Amendment Act, 1890, not adopted.

10. HORSFORTH URBAN DISTRICT (YORKSHIRE); population (1891), 7,102; Dr. Bruce Low.

Authority concerned: Horsforth Urban District Council.

Ground of Inquiry: Report of Medical Officer of Health as to an outbreak of enteric fever; and representations from the Urban District Council as to the failure of the Waterworks' Company to provide a pure supply.

Chief Facts reported by Inspector: For some years there have been local complaints as to quality of the water supply, which is in the hands of a private Company. Gathering ground of Company high-lying pasture land which is dressed freely with stable manure and night soil; sewage from farm-houses and also road washings reach the feeders of supply.

There are 3 reservoirs; 2 for storage, and 1 for compensation water to mill owners. Sand filtration provided; but in summer months as well as at other times it has been customary to turn on unfiltered compensation water to the town mains to augment supply. Following use in September, 1896, of this unfiltered water there occurred a sudden outbreak of enteric fever in October, attributed by Medical Officer of Health to polluted water of Company's service.

Sewerage of district nearly complete. Sewage disposal, by subsidence and land filtration, about to be carried out.

Isolation hospital about to be provided in combination with adjacent authorities. Excrement disposal largely by objectionable privy middens. Scavenging defective. The Infectious Disease (Notification) Act, 1889, not yet adopted. Administration has been lax.

11. KING'S LYNN BOROUGH (NORFOLK); population (1891), 18,360; GAYWOOD PARISH; population (1891), 952; Dr. Mivart.

Authorities concerned: King's Lynn Town Council and Freebridge Lynn Rural District Council.

Ground of Inquiry: Enteric fever; Medical Officers of Health's Reports.

Chief Facts reported by Inspector: Sudden outbreak of enteric fever in both localities early in October. In all, 453 notified cases, and 44 deaths. Fever distributed indifferently throughout both places. Drainage of Lynn defective. Parts of town liable to flooding after heavy rain; arrangements for privy pit emptying bad; water supply derived from River Gaywood, which is exposed freely to pollutions of all kinds throughout its course; water delivered without filtration; abundance of contaminating matters washed into river by excessive rainfall on 29th September. Similar, though less extensive outbreak of enteric fever in June, 1892, referred by Dr. Bruce Low after investigation to a like contamination of the Gaywood river. Borough Isolation Hospital unsuitable. Violent local opposition to new water supply, to obtain which, Provisional Order of Local Government Board necessary.

12. LANCASTER BOROUGH; population (1891), 31,038; Dr. Theodore Thomson.

Authority concerned: Lancaster Town Council.

Ground of Inquiry: Exceptionally heavy mortality from measles in the Borough in the first quarter of 1897; Registrar General's Returns.

Chief Facts reported by Inspector: Measles epidemic in the Borough during the earlier months of 1897; source of the outbreak not traced; its extension aided by schools and by personal communication between the sick and the healthy. Measures taken by the Town Council defective in regard of arrangements for obtaining information from the School Authorities; visitation of invaded dwellings insufficient; isolation of the sick at their homes frequently inadequate, while no cases were removed to hospital; inadequate disinfection of invaded houses and infected articles.

Compulsory notification of measles adopted for the Borough in 1888; measles continued to be notified up to the date of inquiry; in 1897, and in some previous years, a considerable proportion of total cases notified by the householder. Closure of Public Elementary Schools and of a few small private schools resorted to, apparently with beneficial results. Sunday Schools and the larger private schools not closed.

13. MESSINGHAM (NORTH LINCOLNSHIRE); population (1891), 1,060; Dr. Bruce Low.

Authority concerned: Glanford Brigg Rural District Council.

Ground of Inquiry: Outbreak of illness resembling cerebro-spinal fever; local report.

Chief Facts reported by Inspector: Sudden outbreak of illness among children of school ages; only one case fatal. Scattered cases of a kind similar to those observed at Messingham noted by medical men in various parts of North Lincolnshire about the same time, *e.g.*, in the Glandford Brigg, Lincoln, Gainsborough, and Horncastle Rural Districts, and in the Urban Districts of Glanford Brigg, Barton-on-Humber, and Scunthorpe. Locally such attacks regarded as "influenza complicated by meningitis." Some cases observed had purpuric rash. In adults the leading symptoms observed were chilliness, headache, fever, delirium, sometimes retraction of head, insensibility, involuntary passing of urine in bed, great prostration, emaciation, constipation, and profound coma. Protracted convalescence was usual in these cases. Outbreaks of well-marked cerebro-spinal fever occurred at Bardney, in the Lincoln Rural District in 1867; and in the Market Rasen Urban District in 1891.

The symptoms observed at Messingham in 1897 resembled those noted in previous outbreaks of anomalous illness at Raunds and Heyford, in 1891, and at Laxfield in 1894.

14. PHILLACK (CORNWALL); population (1891), 3,379; Dr. Mivart.

Authority concerned: Phillack Urban District Council.

Ground of Inquiry: General sanitary circumstances; reports of Medical Officer of Health.

Chief Facts reported by Inspector: House accommodation very defective; water supply almost exclusively from wells. Eight public wells—all polluted or liable to pollution. Private wells in dangerous condition owing to pollution.

District Council indifferent to the provision of a proper supply of wholesome water. Part of district sewered. Means of flushing sewers scanty, some sewers not flushed at all. Excrement disposal very unsatisfactory. Leaking and overflowing cesspits. Defective privies. No adequate removal of refuse.

Defective cowsheds and dairies.

No isolation hospital or disinfecting apparatus. Infectious Disease (Notification) Act, 1889, not adopted, nor any part of Infectious Disease (Prevention) Act, 1890, or of Public Health Acts Amendment Act, 1890.

15. SHIFNAL RURAL DISTRICT (SALOP); population (1891), 12,222; Dr. Wheaton.

Authority concerned: Shifnal Rural District Council.

Ground of Inquiry: Application for approval by the Board of Bye-laws under Section 44, Public Health Act, 1875.

Chief Facts reported by Inspector: Excrement disposal in the district effected by cesspit privies. Refuse disposal by means of large ashpits. No means of disposal of refuse in parts of the district; refuse therefore collected in heaps in yards or gardens, or on waste places. Scavenging performed by owners or occupiers, very inefficiently. In the more urban portions of the district, *i.e.*, Shifnal town, Oakengates, St. George's, the Nabb, Prior's Lee, and Snedshill (all in the parish of Shifnal), the inhabitants without facilities for getting rid of their collections of excrement and refuse, and not able therefore to comply with bye-laws on this subject matter. Public scavenging urgently required in these places. In the rural portion of the parish of Shifnal, as also in the rural portions of the district generally, the inhabitants not without facilities for getting rid of excrement and refuse, and bye-laws for these portions not therefore contra-indicated

16. SWANAGE (DORSET); population (1891), 2,600; Dr. Wheaton.

Authority concerned: Swanage Urban District Council.

Ground of Inquiry: Local complaints as to insanitary conditions and administration, especially as to discharge of sewage and pollution of streams.

Chief Facts reported by Inspector: The scheme of sewerage for the town, plans of which were submittted to the Board in 1893, and for which permission to borrow the sum of £6,000 was obtained, not complete. The outfall sewer not yet constructed; the newly-constructed sewers connected meanwhile to an old culvert discharging on the foreshore near the promenade. Considerable quantity of sewage still discharged into two streams falling into the Bay at each end of the promenade. Many complaints of nuisance arising from deposit of sewage on foreshore of the Bay. The connection of house drains with the newly constructed sewers not generally enforced, many houses still connected with old unventilated sewers, which are without means of flushing. House drains in older dwellings defective. At Neston, houses unprovided with drains. Excrement disposal by vault privies, pail privies, and W.C.'s. Scavenging of pail privies by contractor; scavenging of vault privies left to occupiers, and very imperfectly performed. Slaughter houses in most unsatisfactory condition. Dairies and cowsheds also in very unsatisfactory condition, and unregistered. No isolation hospital provision. Infectious Disease (Notification) Act, 1889, not adopted.

17. WADEBRIDGE (CORNWALL); population (estimated), 1,200; Dr. Buchanan.

Authority concerned: St. Columb Major Rural District Council.

Ground of Inquiry: Outbreak of enteric fever; report of Medical Officer of Health; and local complaints.

Chief Facts reported by Inspector: From July 1st to October 1st, 1897, fifty cases of enteric fever in Wadebridge and Egloshayle; the latter a place with population of about

900, situate opposite Wadebridge, from which it is separated by River Camel. Nine of these cases fatal. Other 9 cases, with one death, heard of among persons who had visited Wadebridge. Total dwellings invaded, in Wadebridge and Egloshayle, 33. Of these no less than 22 situate in a single quarter of Wadebridge, termed the "Trevanson Street area," and comprising 37 dwellings. The fever in the main distributed by the water of four wells close to one another in the "Trevanson Street area." Manifold opportunities of excremental pollution of the ground water which supplies each of these four wells. Antecedent to, and during first weeks of outbreak, infectious matters from an enteric fever patient brought into relation with these wells by way of a rubble "sewer."

Grave sanitary defects general in Wadebridge. Water from plurality of public and private wells in nearly every case subject to risk of pollution. The "sewers" mere rubble drains. No public scavenging. Other serious shortcomings.

Administration by St. Columb Rural District Council unsatisfactory. No adoptive Acts; no byelaws; no isolation hospital. Results of neglect exemplified in Wadebridge. Here this Authority have neglected to take action as to water supply, sewerage, &c., notwithstanding persistent pressing by the Local Government Board, by Cornwall County Council, by the Medical Officer of Health, and by Wadebridge residents.

Cornwall County Council in 1897 issued an Order constituting Wadebridge and Egloshayle a separate Urban District. Appeal to Local Government Board by St. Columb Major Rural District Council, and by St. Columb Major Board of Guardians against this Order.

18. WATFORD (HERTS); population (estimated), 24,000; and BUSHEY PARISH (HERTS); population (estimated), 5,652; Mr. Arnold Royle.

Authorities concerned: Watford Urban and Rural District Councils.

Ground of Inquiry: Continued prevalence of diphtheria; Registrar General's returns.

Chief Facts reported by Inspector: (*a*) WATFORD:—Diphtheria prevalent in the district for 18 years; during which period 129 deaths have been registered from diphtheria and other throat illness. During the five years to the end of 1896, there were 93 known cases of diphtheria and membranous croup in 78 houses. Diphtheria chiefly affected young persons and children, and was frequently associated with unsanitary conditions of the dwelling.

(*b*) BUSHEY:—Diphtheria in its fatal form absent from the parish only during two of the last 13 years; 34 deaths in that period from diphtheria and other throat illness. In the five years ended with December 1896, there were 38 cases of diphtheria and membranous croup heard of in 25 houses. Diphtheria chiefly affected young persons and children, and was mostly propagated by personal communication. Frequently associated with an unsanitary condition of the dwelling and dampness of the soil.

An isolation hospital has lately been erected jointly by the Urban and Rural authorities.

19. WITNEY (OXFORDSHIRE); population (1891), 3,110; Dr. Fletcher.

Authority concerned: Witney Urban District Council.

Ground of Inquiry: Application by the District Council for sanction to bye-laws imposing the duty of scavenging on occupiers of premises.

Chief Facts reported by Inspector: Refuse and nightsoil deposited in the streets in buckets and pails before 9 a.m., collected by men in the Council's employ. Closets faulty of construction, and many excremental nuisances. Systematic scavenging urgently required. Public water supply urgently needed. No proper system of sewerage; much fouling of water-courses discharging into a tributary of the River Thames. Grave risk of contamination of existing numerous shallow wells, serving as water-supplies, by soakage from privy cesspits, &c. No isolation hospital. General incompetence and neglect on the part of the District Council.

20. WORCESTER; population (1891), 42,908; Dr. Fletcher.

Authority concerned: Worcester Town Council.

Ground of Inquiry: Diphtheria; Registrar General's Returns.

Chief Facts reported by Inspector: Water supply pumped from River Severn just above Worcester. Inadequacy of filters, and of storage capacity of service reservoirs. Severn much polluted by sewage from towns and other places above Worcester. The whole of the crude sewage of Worcester discharged directly into the Severn. Failure of the Town Council to carry out an undertaking, given twelve years ago, to provide efficient outfall works. Water-carriage system all but universal. House accommodation, and condition of yards and courts, on the whole fairly satisfactory. Present isolation hospital unsatisfactory, but large new hospital in course of erection. Iron small-pox hospital provided.

During 1896, 319 cases of diphtheria (with 49 deaths) were notified, and during first half of 1897, 52 cases (with 12 deaths). Incidence of the disease on children of school-going age nearly 3 to 1 as compared with incidence on persons above and below that age. Disease not confined to any special part of the city, nor were the poorest parts most affected. No definite cause for the outbreak and its persistency ascertained.

Town Council active and working well, excepting as regards their neglect to provide efficient sewage outfall works.

21. WREXHAM BOROUGH (DENBIGHSHIRE); population (1891), 12,552; Dr. Wheaton.

Authority concerned: Wrexham Town Council.

Ground of Inquiry: Prevalence of diphtheria; application of the Town Council for inquiry.

Chief Facts reported by Inspector: Comparative freedom from diphtheria until beginning of 1896, when the outbreak in question commenced, and was continued into 1897. Between January 1st, 1896, and April 30th, 1897, 122 attacks of diphtheria occurred, and 4 attacks of croup. Mortality 29·5 per cent. Very extensive prevalence of anomalous throat affections, beginning in January, 1896, and ceasing in the autumn of that year. The outbreak of diphtheria commenced in cottages near the town refuse depôt; from thence infection carried to two of the public elementary schools; subsequent spread chiefly due to infection received at school.

Isolation hospital and disinfecting apparatus provided. Scavenging not satisfactory. Many causes tending to fouling of the soil and of the air in the neighbourhood of dwellings; such as defective paving and draining of yards, defects of house drainage, nuisances arising from accumulations of manure, from keeping of animals, and from accumulations of house-refuse in uncovered ashpits.

22. WRIBBENHALL (WORCESTERSHIRE); population (1891), 1,278; Dr. Theodore Thomson.

Authority concerned: Kidderminster Rural District Council.

Ground of Inquiry: Observation of unhealthy conditions by the Inspector while officially employed in the neighbourhood.

Chief Facts reported by Inspector: The water supply open to dangerous pollution. Defective conditions of sewerage and of sewage disposal. Methods of disposal and removal of excreta and house refuse greatly in need of improvement. Defective conditions of house drainage. Not a few unhealthy dwellings. Paving of yards not infrequently unsatisfactory.

No. 6.

REPORT upon the Occurrence of Certain Cases of ENTERIC FEVER in SIX SANITARY DISTRICTS of ESSEX and SUFFOLK, and upon OYSTERS in relation thereto; by Dr. G. S. BUCHANAN.

APP. A. No. 6.

On the Occurrence of Enteric Fever in East Anglia in relation to Oyster Consumption; by Dr. Buchanan.

In October, 1897, Dr. J. W. Cook, Medical Officer of Health for certain Urban and Rural districts in East Essex, made report to the Board of suspicion entertained by him that enteric fever recently occurring among a number of persons resident within the area under his charge had resulted from eating oysters brought into his district from outside sources. Also, Dr. Cook stated in regard of certain other recent sufferers by enteric fever not resident in his district, that allegation had been made as to their having become infected similarly by eating oysters partaken of within one of the districts for which he acts as Medical Officer of Health. In all the above instances in which oysters had been under suspicion of having caused enteric fever, these shellfish had come—so far as Dr. Cook had been able to ascertain—from Brightlingsea, an Urban District outside the area for which Dr. Cook is Medical Officer of Health.

The Board desiring further information in the matter, and apprehending that to this end inquiry in a plurality of sanitary districts would become needful, determined on investigation of the circumstances by one of their Medical Inspectors. On receipt of instructions, I visited the several places concerned during the last week of October and at subsequent dates.

§1. *As to certain cases of Enteric Fever, considered in relation to possible infection of the sufferers by means of Oysters.*

The enteric fever cases suspected to be due to oysters of which I learnt from Dr. Cook, along with certain others which came to my knowledge in the course of my inquiry, amounted in all to 26. Three of them had proved fatal. They had occurred in the following districts:—

Clacton Urban District	4
Walton-on-the-Naze Urban District	1
Haverhill Urban District	9
Braintree Urban District	2
Lexden and Winstree Rural District	2
Tendring Rural District	8
	26

In regard of these 26 fever cases my first business was to ascertain in each instance:—

(*a*.) Whether the diagnosis was in any wise open to doubt: and if not, the date of definite onset of illness; with a view to determining as nearly as possible the date at which the sufferers had become infected?

(*b*.) Whether the sufferer had as matter of fact partaken of oysters at such date antecedent to commencement of illness as was consistent with his infection having been received in this way; and if so, whence the oysters in question had been derived?

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(c.) What, if any, were the conditions, *irrespective altogether of oysters*, to which the sufferers had been subjected antecedent to attack, and which could be thought of as possibly concerned with the causation of his fever?

With reference to the above questions, and before entering into the details of the subject, I may at once state that I did not learn of any instance in which the medical attendant had found reason to doubt the accuracy of his diagnosis of enteric fever, or could tell me of clinical appearances which seemed inconsistent with such diagnosis; and that every one of the 26 persons concerned had, as matter of fact, partaken of oysters shortly antecedent to illness.

Further, I may state at the outset that the oysters in question had in each of the 26 instances been eaten raw, and that none of them were English "natives." All the oysters were of the class termed "foreign" (as for instance "Portuguese" and "American"), and had been sold cheaply, as is the custom in this part of Essex during the summer months.

The following are the results of detailed inquiry respecting each of the 26 cases.

CLACTON URBAN DISTRICT. (1891 population, 3,584.)

Cases in Clacton-on-Sea.—(1) J. B., aged 28, Chapman Road. Attacked by enteric fever between June 14th and 16th. The sole occupants of Mr. B.'s dwelling are himself and his wife, who had not suffered from fever. J. B. had not, in his remembrance, been outside Clacton-on-Sea for at least three weeks prior to the onset of his illness, he having during those weeks been in daily work, as a plumber, in a new hotel then building in the town.

On several occasions during each of these three weeks Mr. B. had eaten Portuguese oysters (price 6d. a dozen) procured from hawkers, who came regularly to the new hotel and who sold oysters to numerous workmen there. He is, however, unable to identify the particular hawker or hawkers from whom these oysters were obtained. He knew of only one case of illness among his fellow workmen, a labourer (who has since left the district), who in the latter part of June suffered from severe headache and diarrhœa for about a week. This labourer had also frequently procured oysters during June from one or other of the hawkers visiting the hotel.

J. B.'s wife had not eaten oysters during the period in question.

(2) Wm. C., aged 44, Station Road. Attack of enteric fever began with severe headache and vomiting on September 15th. The other occupants of Mr. C.'s house are Mrs. C., aged 44; two children, aged respectively 15 and 16, and a servant, aged 17. None of these persons had suffered from fever.

Mr. C. is in business as a draper, and had not during the last week of August or the first weeks in September been away from Clacton-on-Sea. He informed me that during August he purchased oysters at least once a week from M.'s stall in Clacton. These oysters were always "Portuguese," and Mr. C. usually obtained about two dozen at a time. In particular, he recalled eating oysters from this stall on August 28th, and stated that he had also eaten oysters from the same source on several days which he cannot particularise between August 28th and the date of his attack. The other members of his family very rarely eat oysters, and had not, as far as could be ascertained, eaten oysters during three weeks prior to September 15th.

(3.) A. F., aged 40, Church Road. Date of attack by enteric fever September 11th. The other occupants of Mr. F.'s house are Mrs. F., aged 39; and two sons, 12 and 10 years old respectively. None of these had been attacked. Mr. F. is a farrier and blacksmith, and stated that his occupation had taken him to various places in the neighbourhood of Clacton-on-Sea during the three weeks prior to his attack. Mr. F. had been a regular customer of H., a hawker from Brightlingsea, who sold oysters in Clacton-on-Sea during the summer months of 1897. Mr. F. had eaten a dozen or more of H.'s oysters on at least one occasion during the week ending August 28th, and had eaten others during the following week.

Mr. F. occasionally shared H.'s oysters with Mrs. F. and his two sons. But whether or no he had shared with others oysters which he had obtained from H. during the three weeks prior to his attack could not be determined.

(4.) Arthur Fn., aged 24, St. Osyth Road. Attacked by enteric fever between September 28th and October 3rd. Died from hemorrhage, October 18th. He had been living in the same dwelling as his father, aged 53; mother, aged 45; sister, aged 16; and a lodger, aged 27. None of these had suffered from fever. He had been in daily work at Clacton-on-Sea as a builder's labourer for several weeks prior to his attack.

On September 16th, Arthur Fn. consumed a dozen or more out of a batch of "Portuguese" oysters purchased in Clacton on that day from the Brightlingsea hawker H. His father and sister had eaten one or two oysters apiece, and the lodger about a dozen, all from the same batch.

Prevalence of Enteric Fever in Clacton-on-Sea between June and October 1897:—I could not learn from notifications of infectious sickness sent to the Medical Officer of Health, or as a result of inquiry of medical practitioners in Clacton-on-Sea, that any other persons in the town besides the four above referred to had suffered from enteric fever between the beginning of June and the date of my visit in October.

In the whole Urban District of Clacton during this period only one other case of enteric fever had come to the knowledge of the Medical Officer of Health. This was a girl who lived at Great Clacton, nearly two miles from Clacton-on-Sea, who was attacked at the end of September.

Apart from question of oysters, such evidence as I could obtain as to the agency or agencies of infection which had been operative in these cases was wholly of negative sort. The four persons in question lived in different parts of Clacton-on-Sea: no one of them could be ascertained to have come in course of occupation or otherwise into personal relation with any of the other three: two had been served at their homes with water from the public supply, while other two had in each instance resorted to private wells on their own premises: milk, if any, consumed by these four persons had come from at least two dairymen, each of whom obtains milk from a separate farm. In view of the large sale of ice-creams in Clacton-on-Sea during summer months, I made inquiries as to this substance of the three persons who had survived the fever. None of them were, however, addicted to eating ice-cream, and one stated that he had not eaten any form of "ices" for years. One of these three had frequently drunk various kinds of aërated waters, another stated that he never drank aërated water or any form of "temperance drinks."

WALTON-ON-THE-NAZE URBAN DISTRICT. (1891 population, 1,586.)

(5.) A. W., a girl aged 21, attacked by enteric fever between September 25th and 27th. A. W.'s home is in London. She had come on a visit to a relative at Walton-on-the-Naze during the last week in August, and had not gone outside that town or its immediate neighbourhood between the time of her arrival at Walton and the date of her attack. At a date in the second week in September, which it appears probable was September 10th, she ate one, or perhaps two, oysters, brought to the door of her relative's house by a hawker, J., from Brightlingsea. American "East River" oysters, Mr. J. informed me, are the variety which he usually sells at Walton. His price is a penny for two.

In Walton-on-the-Naze Urban District, between June and October 1897, no cases of enteric fever other than that of A. W. had been notified to or had otherwise come to the knowledge of the Medical Officer of Health.

HAVERHILL URBAN DISTRICT. (1891 population, 4,587.)

(6.) Wm. F., aged 7, Eden Road. Attacked by enteric fever between September 8th and 10th.
(7.) Lily H., aged 18, Eden Road. Attacked September 7th.
(8.) Arthur B., aged 12, Dudbury Road. Attacked September 9th.
(9.) Reginald W., aged 12, Pease Hill. Attacked September 7th.
(10.) Geo. B., aged 15, Primrose Hill. Attacked September 9th.
(11.) Albert B., aged 16, Masons Yard. Attacked September 9th.
(12.) Wm. P., aged 12, Eden Road. Attacked September 9th.
(13.) Frank W., aged 15, Charity Row. Attacked September 8th.
(14.) Frank K., aged 12, outside the town. Attacked September 9th.

On August 23rd, I learnt, a party of some 250 Haverhill youths, belonging to an association of sons of members of a local friendly society, were taken for a day's excursion to Clacton. A considerable number of relatives and friends of many of these youths availed themselves of the excursion train and went to Clacton and back on the same day. The above eight boys and girl who were attacked by enteric fever had each been to Clacton with this excursion:—seven boys as members of the association, and one boy and the girl independently of the association. This and other circumstances had led Dr. Armistead, Medical Officer of Health of the Haverhill Urban District, to the conclusion that infection had in each instance been contracted whilst the persons in question were away from Haverhill on August 23rd. Investigation at Haverhill, made with Dr. Armistead's assistance, gave support to this view of the case. In particular:—

(*a*.) The onset of illness in all nine cases had been between September 7th and September 10th, a fact consistent with the belief that infection had been contracted on August 23rd.

(*b*.) The dwellings of the nine persons attacked lay in different parts of Haverhill Urban District, one of them, indeed, being nearly a mile outside the town of Haverhill. These nine persons had sundry different occupations and places of work; indeed, except on August 23rd, they did not appear to have been brought together at any time shortly antecedent to their attack. Dr. Armistead had ascertained that the dwellings of these persons were served by a plurality of wells, and that their families had been supplied with milk from several separate sources.

(*c*.) Except for the excursion on August 23rd, none of the nine persons had been outside Haverhill or its immediate neighbourhood during the last weeks of August or first week of September. During these weeks the Urban District of Haverhill had been free from enteric fever. I found, indeed, that between the beginning of June and the date of my visit in November, only two persons in the Haverhill Urban District, in addition to these nine, had been notified to Dr. Armistead as suffering from enteric fever. The first of these, attacked in June, was a person who had contracted enteric fever outside the district altogether and from whom no spread of fever could be traced; in the second case, notified on September 23rd, the medical attendant informed me that the clinical history subsequent to the date of notification had convinced him that the patient's illness had not been enteric fever.

In view of these considerations, there appeared to be little doubt that in each of these nine cases infection had taken place at some time or other during the excursion on August 23rd.

I next made detailed inquiry in each case as to articles of food or drink consumed on August 23rd. It appeared that on reaching Clacton-on-Sea railway station, the various Haverhill excursionists, including the nine persons in question, went their several ways in search of amusement—to the beach, pier, and elsewhere. Seven of the nine had come together in a refreshment establishment at Clacton in the afternoon, where a "tea" was provided for the members of the association. At this meal they were given tea, bread and butter, jam, and cake. The girl and the boy who did not belong to the association had not, however, partaken of this "tea." Most of the nine had taken with them from Haverhill various articles of food. All had, however, purchased sundry articles of food or drink in Clacton, principally from stalls on the beach and pier, or from itinerant vendors. Eight of the nine had, I found, eaten ice-cream from one or another vendor: seven had drunk aërated waters, one had drunk unaërated lemonade, one other had beer and neither lemonade nor aërated waters. None of them had drunk milk, except in tea. Nor, as far as they could remember, had any one of them drunk plain water during the time they were away from Haverhill.

Oysters had been eaten by each of these nine persons. The variety of oyster could not be determined, but the price paid for them, two a penny or sixpence a dozen, left little doubt that the oysters in question belonged to the general class to which I have above referred. The number of oysters consumed in each case varied: three-pennyworth, or half a dozen, appeared to have been the usual extent of the boys' indulgence. One boy ate four oysters only, another admitted to two dozen. The girl attacked believed that she had eaten not more than one oyster.

From descriptions given, I ascertained that six of the nine had purchased their oysters from the stall of Mr. M. at Clacton-on-Sea. One other described a stall on the beach which I could not identify. Other two had dealt with some hawker or hawkers who carried baskets of oysters up and down the beach. The description of the hawker was in each instance insufficient to enable me to identify the vendor.

The secretary of the association, who had superintended the arrangement of the excursion, told me that from personal observation he believed that considerable proportion, perhaps a quarter, of the 250 youths who went t

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Clacton on August 23rd would have spent a few pence on oysters or upon other shellfish.

BRAINTREE URBAN DISTRICT. (1891 population, 5,203.)

(15.) J. G. N., aged 33, and (16.) his son, H. N., aged 16. First symptoms of enteric fever appeared in each instance on September 6th. J. G. N. and H. N. had visited Clacton-on-Sea on August 23rd, returning to Braintree the same evening. Save for this visit neither father nor son had been out of Braintree during the last weeks of August or first week of September.

On August 23rd, J. G. N. and H. N. had taken their day's holiday at Clacton along with Mrs. N., a brother of H. N., and a neighbour. They had taken dinner with them, and they had but one meal at Clacton, namely "tea" at tea rooms on the beach, which are kept by Mr. M. This meal consisted in each instance of tea, bread and butter, and oysters. The oysters in question came from Mr. M.'s stall adjoining the tea room. One dozen "Portuguese" oysters were purchased, and were divided between the five. J. G. N. had eaten two oysters, H. N. three. The N.'s informed me that besides what they consumed at this "tea" and the provisions which they had taken from Braintree, there was no other article of food or drink which J. G. N. or H. N. had consumed at Clacton-on-Sea or in the course of the journey there or back. In particular, neither had drunk aërated waters, lemonade, milk (except in tea), or plain water. Neither had partaken of ice-cream.

No case of enteric fever in the Braintree Urban District, other than of J. G. N. and H. N., had been notified to or had otherwise come to the knowledge of Dr. Stevens, the Medical Officer of Health, from the beginning of 1897 up to the date of my visit in November. In these circumstances, and having regard to the period of incubation of enteric fever, it appeared almost certain that infection had been contracted out of Braintree on August 23rd.

LEXDEN AND WINSTREE RURAL DISTRICT.

Case at Brickhouse Farm.—(17.) F. F., aged 15, attacked by enteric fever on September 19th. F. F. had died on October 10th and few particulars were to be had in his case. It appeared however that this youth had come home from school seven weeks before the onset of his illness. During this period he had occasionally walked or bicycled to Colchester or other places within a few miles of Brickhouse Farm, but had not stayed any nights away from home. On the afternoon of September 1st he had been with his father to Clacton-on-Sea, returning the same evening. On this day they ate between them a dozen or more oysters from a stall at Clacton pier kept by Mr. U. These oysters had been sold at two shillings a dozen. They had been designated "Scotch," but this, I learnt from Mr. U., was merely a euphemism customary in the trade. Only "Portuguese" and "American" oysters have been sold at Mr. U.'s stall at Clacton this summer.

There had been no case of enteric fever or of illness of suspicious sort at Brickhouse Farm antecedent to F. F.'s attack. Dr. Cook, Medical Officer of Health of the district, had heard of no case of enteric fever in dwellings near to this farm, or in the neighbouring village of Peldon, from the beginning of the year up to the date of my visit in November.*

Case at Bell House Farm.—(18.) H. B., aged 19, attacked between September 12th and 14th. H. B. is the son of a farm labourer. He had been at work "harvesting" in the neighbourhood of Bell House Farm for three or four weeks prior to his attack. During this period he had not been more than a mile or two away from his home, except on one occasion, September 2nd, when he went to a regatta at Clacton-on-Sea, returning the same evening.

From the beginning of 1897 up to the date of my visit in November no other case of enteric fever had occurred among the other persons living at the B.'s dwelling. No case of enteric fever in farms or dwellings near to Bell House Farm or in the neighbouring village of Stanway had come to the knowledge of Dr. Cook during the same period.

At Clacton, on September 2nd, H. B. had eaten a dinner of pie, bread, and ginger beer; he had also eaten cakes and drunk ginger beer from a stall on the beach, and had eaten four oysters, which from description appeared to have been Portuguese, at Mr. M.'s oyster stall.

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* I learn from Dr. Cook that since my visit other members of this household have fallen ill with enteric fever.

H. B. was the only person from his own dwelling who visited Clacton on September 2nd. He had, however, as companions on this date four boys from the neighbourhood, one or two of whom ate oysters at the same time as himself. None of these boys, I was informed, had suffered from any ailment after their return home.

TENDRING RURAL DISTRICT.

Cases in the parish of St. Osyth. (1891 population, 1,441.)

(19.) Mrs. A., aged 33, Mill Street. Date of attack uncertain. Was first seen by Dr. Steele, the medical practitioner at St. Osyth, on October 4th. She then gave a history of illness of some three weeks' duration, and was found to be suffering from fever and diarrhœa. Judging from the subsequent history of the case, Dr. Steele inclines to the view that on October 4th she was in the third or fourth week of enteric fever, her illness having been at first of mild type, and then, shortly before October 4th, having become severe owing to absence of medical treatment. On this reckoning Mrs. A.'s attack is to be thought of as having taken place somewhere in the course of the second or third week in September. Subsequently she suffered from two well-marked relapses.

Living in the same dwelling as Mrs. A. are Mr. A., aged 40, and 7 children at ages between 13 and 1½ years. None of these persons had been attacked.

During the latter part of August and during the part of September antecedent to her illness, Mrs. A. had been away from the village of St. Osyth on one occasion only: namely, the afternoon of August 23rd, when she drove to Clacton-on-Sea (some 5 miles away) in order to accompany her aunt, aged about 50, who was going by train from Clacton to her home at Stratford. On this day Mrs. A. and her aunt had tea at Mr. M.'s tea rooms on the beach at Clacton, and between them ate one dozen of Mr. M.'s oysters, at a cost of sixpence.

Mrs. A. had not heard that her aunt had suffered from any illness since her return to Stratford.

(20.)	F. family	E. F. aged 28, attacked by enteric fever on October 12th.
(21.)		Mrs. F. aged 29, attacked October 13th or 14th. Died October 25th.
(22.)		C. F. aged 3½, attacked October 13th or 14th.

The inhabitants of Mr. F.'s dwelling who had not suffered from enteric fever were A. F., aged 4½, and an infant of 12 months.

The Brightlingsea hawker H. came to the village of St. Osyth every Saturday evening during the summer and autumn of 1897 with a basket of oysters, and sold them at the cross roads there. These oysters were principally Portuguese, but occasionally Mr. H. sold other varieties of foreign oysters—always at the same price, sixpence a dozen.

Mr. F., a baker of St. Osyth, had this year been a customer of H. on many Saturdays. He had eaten some of H.'s oysters, he believes, on September 25th; a dozen, he clearly remembers, on October 2nd; but none on the following Saturday, October 9th. On October 2nd, after eating his dozen, he took home another half dozen, which were divided between Mrs. F. and his two children C. F. and A. F. Neither his wife nor either of their children had eaten oysters on any other occasion during September or October.

(23.) A. L., aged 18, Clacton Road. Attacked by enteric fever on October 17th. This youth was a labourer, who, prior to his attack, was in daily work at Duchess Farm, near St. Osyth. He was living in the same house as his father (aged 45), his mother (aged 43), and four children between 10 and 4 years old. None of these had suffered from fever.

A. L. had eaten H.'s oysters at St. Osyth on several Saturdays during this autumn. In particular, he remembers eating oysters on October 9th,† and believes that he also ate oysters on October 2nd. None of A. L.'s family had eaten oysters during three or four weeks antecedent to his attack.

(24.) W. B., aged 33. Earls Hall. Attacked by enteric fever on October 17th. This man was in employment as a horse keeper at Earls Hall, about a mile from St. Osyth village. He was living in the same dwelling as his wife, aged 28, and five children. None of these had suffered from fever.

Mr. B. remembers eating a dozen of H.'s oysters on Saturday, October 9th. He likes oysters, and stated that probably during the three weeks preceding his attack he had eaten oysters on other occasions. Whether or no he ate H.'s oysters on October 2nd he cannot be certain. None of the other residents in W. B.'s dwelling had eaten oysters during the three weeks prior to W. B.'s attack.

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† On the night of October 9th a large fire occurred in the locality, and I found persons in St Osyth were in consequence able to recall facts about this Saturday with more precision than as to the previous Saturdays.

(25.) P. H. G., aged 18, Colchester Road. Attacked by enteric fever on October 18th. This youth was a gardener at St. Osyth Priory, and was in daily work there up to the time of his attack. Living in the same dwelling were his father, aged 44; his mother, aged 46; and eight children, at ages between 2 and 20 years. None of these had suffered from fever.

P. H. G. ate two shillings' worth of H.'s oysters (or four dozen) at St. Osyth on the night of October 2nd, and also ate H.'s oysters on October 9th. No other persons at his home had oysters on either of these days or during the three weeks which preceded his attack.

(26.) D. L., aged 20, Mill Street. Attacked by enteric fever on October 17th. D. L. was in daily work as a labourer at Block House Wick, near St. Osyth, up to the date of his attack. Living in the same dwelling were his father, aged 43; his mother, aged 38; and a brother, aged 18. None of these had been attacked.

D. L. had eaten H.'s oysters on October 9th. He did not think that he had eaten oysters on the previous Saturday, October 2nd, but he is an occasional Saturday customer of H., and may, he stated, quite possibly have dealt with H. on this date.

On October 9th he had shared the oysters which he bought with the three other members of his family.

Prevalence of enteric fever in the Parish of St. Osyth:—From the beginning of 1897 up to the time of my visit in November no case of enteric fever other than the eight in question had, I found, come to the knowledge of Dr. Cook, Medical Officer of Health of Tendring Rural District, or of Dr. Steele, the local medical practitioner.

Apart from any question of oysters, such evidence as I could obtain as to the agency or agencies of infection which had been operative in these St. Osyth cases proved of negative sort.

From consideration of the dates of attack, it was clearly necessary to look for some source or sources of infection which could have operated toward the end of September on the seven persons (cases 20 to 26) attacked between October 12th and October 18th.

Now during the period in question Mrs. A. (case 19), living at Mill Street, at the western end of the village, was suffering from enteric fever. I endeavoured to learn therefore whether during this time any of the seven persons who were attacked between October 12th and 18th had been associated with Mrs. A. or with the A. family, or whether any of them had consumed water from the well to which the A. household resorted. Inquiries in this direction were, however, without affirmative result in any case.

Next with reference to questions of infected soil or water supply, I ascertained that one of the five dwellings in which the seven persons resided was outside the straggling village of St. Osyth altogether, and that the remaining four were situate in different parts of the village. Only two of these five dwellings are served by the same well. This well also serves six other dwellings in which no case of fever occurred.

Most of the total eight sufferers by the fever in St. Osyth (including Mrs. A.) had drunk milk in tea only, and such milk as had been consumed by these eight persons prior to their attack had come direct to the consumer from at least three separate farms. It was, of course, impossible to ascertain the complete dietary of any of the persons attacked for a series of days during which they had been pursuing their ordinary occupations. One had eaten tinned salmon a week antecedent to onset of illness. Otherwise I could not learn that any had eaten tinned meat or tinned fruit, watercress, or ice-creams during the period. Only four of those attacked had at all frequently consumed aërated waters.

The facts thus far established may be summarized after this fashion:—Among a population of some 16,000, distributed among places as far apart* as the Haverhill, Braintree, Clacton, and Walton-on-the-Naze Urban Districts, the St. Osyth rural parish, and certain quarters of Lexden, a total of 29 persons only were heard of as having been attacked by enteric fever between the beginning of June and the end of October; and of these 29 persons, no less than 26 had consumed oysters about a fortnight† before the date of their attack.

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* Clacton, Walton, and St. Osyth are on the east coast of Essex. Braintree is inland, in the centre of the same county. Haverhill (in Suffolk) is 18 miles from Cambridge.

And, alternatively, the facts may be stated in this wise:—Among inhabitants of, *and visitors from certain districts to,* the more limited area comprising the town of Clacton-on-Sea, Walton-on-the-Naze, and the parish of St. Osyth, the total of persons heard of as having been attacked by enteric fever during the months in question was 26. All these 26 persons had consumed oysters in each instance about a fortnight before the onset of illness, on one of the few days, that is, on which at the ordinary reckoning of the incubation period of enteric fever, they must be thought to have received their infection.

Can these coincidences have been mere matter of chance? Be it noted that in the watering places of Clacton-on-Sea and Walton-on-the-Naze oysters are consumed by the thousand in the summer months, particularly by visitors and by excursionists; and that the inhabitants of the village of St. Osyth, living within two miles of the large oyster layings of Brightlingsea Creek, are very likely addicted to oyster eating. It was then to be expected that if any 26 persons of age and sex such as are in question had been picked out at random from inhabitants of, or visitors to, these places, there would be found among them a not inconsiderable proportion which frequently, or at least occasionally, had eaten oysters. But in the particular instance the proportion of oyster eaters was more than considerable: it was a hundred per cent.—it was all. Every one of the 26, selected by the accident of having been the only persons known to have suffered from enteric fever in a given period, was found not only to have consumed oysters, but to have eaten them within such period of his attack as was consistent with the occasion of eating having been the occasion of infection.

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† I have taken "about a fortnight" to be as near a definition of the incubation period of enteric fever as can be made, in view of the often insidious onset of the disease. In the case of 24 of the persons in question the number of days which had elapsed between eating oysters and onset definite illness appeared to have varied between 10 and 18, consistent at both limits with observed variations in enteric fever incubation.

In the case of D. L. of St. Osyth (No. 26), if October 9th be taken as the only day shortly antecedent to onset of illness on which this youth ate oysters, the interval was but eight days—a period consistent with a possible, although an unusually short, incubation time. As has been stated, however, question arose whether D. L. had not also eaten oysters a week previous to October 9th.

I have also included in this category the case of Mrs. A., of St. Osyth (No. 19). The date of onset of fever in her case could only be fixed in an indefinite way, but it appeared that the interval between oyster eating and first sickening had been about three weeks—a period longer than the usual incubation time of enteric fever, but not sufficiently long to put out of question a coincidence of the day of eating oysters with the day of infection. In considering Mrs. A.'s case the reader will not have failed to note that the date on which she visited Clacton-on-Sea was the same as that on which the Haverhill and Braintree excursionists apparently contracted infection there, and that the oysters eaten by Mrs. A. had come from a stall which had supplied certain of these excursionists.

Inasmuch, however, as neither D. L.'s nor Mrs. A.'s illness can be thought of as having conduced to the occurrence of any of the other 24 cases, assumption that neither D. L. nor Mrs. A. contracted enteric fever on the day of eating oysters would not materially affect the argument in the text.

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The improbability that a series of coincidences such as this should have happened by mere accident is obviously very great. It was indeed manifest that I could find no warrant for invoking such an extraordinary freak of chance in explanation, unless I were in position to show that some agency or agencies of infection other than oysters‡ had with great likelihood operated to produce all, or at least a majority, of the 26 cases in question.

But now, when the question of agencies of infection other than oysters came to be considered, it appeared that such evidence as I had been able to obtain in the matter had been altogether of the negative sort. Thus:—

(1.) Inquiry made in the case of each of these 26 persons with a view to referring their enteric fever to infection from a previously occurring case or cases of fever, either within the dwelling or in the town, village, or neighbourhood, had in each instance been without anything approaching affirmative result.

(2.) Furthermore, the facts hardly left room for doubt that 11 of the 26 persons attacked (namely, nine at Haverhill and two at Braintree) had in each instance come by their infection at Clacton-on-Sea on their one day of visit there, August 23rd. At this date, be it noted, no person in Clacton-on-Sea could be heard of as suffering from enteric fever. And further, in these 11 cases detailed inquiry had failed to show that at Clacton-on-Sea there had been any article of food or drink other than oysters of which all the eleven had partaken.

Apart therefore from any question of the origin of the particular oysters implicated, or their history prior to reaching the persons consuming them, the facts appeared to afford very definite indication that in these 26 cases oysters had operated as the agency of infection.

§2. *As to the source from which the Implicated Oysters had been derived.*

From the histories already given it will be seen that the implicated oysters had been purchased as follows:—

(*a.*) From the itinerant hawker, Mr. H., either at Clacton-on-Sea or at St. Osyth:—
  Last week in August—Case 3.
  September 16th—Case 4.
  First two weeks in October—Cases 20, 21, 22, 23, 24, 25, and 26.

(*b.*) From the stall-keeper at Clacton-on-Sea, Mr. M.:—
  Last week in August—Case 2.
  August 23rd—Cases 6, 7, 8, 10, 12, 13, 15, 16, 19.
  September 2nd—Case 18.

(*c.*) From the itinerant hawker, Mr. J., at Walton-on-the-Naze:—
  Second week in September—Case 5.

(*d.*) From the stall-keeper on Clacton pier, Mr. U.:—
  September 1st— Case 17.

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‡ Lest I be thought of as assuming, without sufficient warrant, that oysters *are* capable of conveying the infection of enteric fever, I refer here to the outbreak of this disease in 1894, at the Wesleyan College, Connecticut, which was demonstrated by Professor Conn to have been due to specifically infected oysters. A reprint of Professor Conn's report will be found in the Supplement in continuation of the 24th Annual Report of the Medical Officer of the Local Government Board (1894-95), "On Oyster Culture in Relation to Disease."

(*e*.) From vendors at Clacton-on-Sea, unknown (itinerant hawkers in three instances, a stall on the beach, not identified by description, in the fourth):—

First week in June—Case 1.
August 23rd—Cases 9, 11, 14.

I may now set out the result of my inquiries in respect of oysters sold by these several vendors, in the order above given.

(*a*.) The itinerant oyster vendor, *Mr. H.*, who lives at Brightlingsea, told me that all oysters retailed by him, both at Clacton and at St. Osyth, during 1897 had been directly supplied to him in Brightlingsea by his relative, Mr. Z., an owner of oyster layings there. He had made no exception to this custom in August or September of this year. Mr. Z., at Brightlingsea, confirmed this statement of Mr. H.

(*b*.) *Mr. M.*, of Clacton-on-Sea, sells oysters in the summer months from a stall on the beach near the pier. He is locally held to do a larger trade in oysters, at all events with visitors and excursionists, than any other Clacton dealer. Mr. M. informed me that during the summer season of 1897 he had obtained his oysters chiefly from one or other of two owners of oyster layings at Brightlingsea. During the earlier weeks of this season he had ordered all oysters from the first of these, Mr. P. Then in the middle of July he transferred his custom to the second, Mr. Q. But on making further inquiries of Mr. M. as to the origin of oysters sold by him during the period under consideration, namely, from August 23rd to September 2nd, I ascertained that in August Mr. M., either because he was dissatisfied over some question of price, or for other reasons, had suddenly discontinued all orders to Mr. Q., and instead, had dealt exclusively with a middleman, Mr. N., of Brightlingsea. Having dealt with Mr. N. for some three weeks, he reverted to his previous habit, and, as before, ordered all his oysters from Mr. Q. This story was confirmed, at Brightlingsea, both by Mr. Q. and by Mr. N. The former was good enough to extract for me from his books a list of his dealings with Mr. M. From this extract it appeared that after supplying Mr. M. with some 2,000 oysters every two or three days between July 19th and August 7th, Mr. Q. sent Mr. M. no more oysters until September 3rd. The implicated oysters sold by Mr. M. had thus, it seemed clear, been supplied by the middleman, Mr. N.

Mr. N., I found, is not habitually an oyster dealer, but as he possesses a cart, and frequently drives from Brightlingsea to Clacton, he had, in August and September, commenced a certain quantity of traffic in oysters, Mr. M. being his principal customer. Mr. N. informed me that he had obtained nearly all the oysters which he had sold to retailers at Clacton-on-Sea from one or other of three owners of oyster layings at Brightlingsea, namely, Mr. Z., already mentioned, Mr. X., and Mr. Y.; only on one or two exceptional occasions during the year had he dealt with owners of other layings. In particular, Mr. N. believed he had not obtained oysters from any persons other than the three oyster merchants in question during the last weeks in August or first weeks in September. Mr. Y. confirmed in general terms the statement that Mr. N. had during a few weeks of this year been a wholesale customer. Messrs. Z. and X. stated in each instance that they had supplied Mr. N. with oysters, but only to a trifling extent. No record of dealings with Mr. N. had, however, been kept by any of these three merchants, for the reason that Mr. N.'s. transactions had been wholly "ready money."

(*c*.) The itinerant hawker, *Mr. J.*, informed me that all oysters sold by him in 1897 had been obtained from owners of oyster layings at Brightlingsea, and that in particular, three such owners, Messrs. Z., Y., and V. had between them supplied all the oysters which he had sold in the summer months. From one or other of these three owners, he stated, he would have obtained any oysters sold during the second week in September.

(*d*.) *Mr. U.*, the proprietor of the stall on Clacton Pier, is a London oyster merchant in a large way of business, owning layings in various parts of England. He informed me that in the summer of 1897 it had been his custom to send from London the majority of oysters sold at his stall at Clacton-on-Sea. But, he added, if for any reason the manager of his Clacton stall found himself run short of oysters, the emergency would be met by obtaining a supply from one or other of the oyster merchants at Brightlingsea. Whether or no an emergency of this sort had arisen on September 1st, the date at which Mr. U.'s oysters had come into question, I was unable to ascertain.

(*e*.) *Vendors at Clacton-on-Sea, some not identified.*—The number of persons who sell oysters of foreign origin at cheap prices at Clacton-on-Sea during the summer and autumn is considerable. A few have stalls or barrows, the majority go about the sea front with oysters in baskets. Several of these oyster vendors come from Colchester and places outside Clacton. I made inquiries of as many of these vendors as I could trace in order to ascertain whence they obtained their oysters. Certain few vendors, Mr. M. among the number, usually have oysters consigned to them at Clacton-on-Sea by rail, at intervals of every few days, by owners of oyster layings at Brightlingsea. A few other vendors, like Mr. J. and Mr. H., purchase oysters at Brightlingsea from merchants there, and themselves convey these oysters to Clacton. The custom of other retailers is to obtain all their oysters at Clacton from a middleman. I heard of only two such middlemen—one Mr. N., already referred to, whose dealings during 1897, except with Mr. M., had been on quite a small scale; the other, Mr. W., who had supplied a majority of the Clacton oyster vendors. Mr. W. informed me that all oysters which he supplied wholesale during the summer season in question had been obtained by him direct from one of three owners of oyster layings in Brightlingsea, namely, Messrs. P., Q., and R. One other class of oyster vendors at Clacton requires to be mentioned, namely, certain hawkers of fruit, shrimps, and other commodities, who, when they have run short of their ordinary wares, purchase oysters from the middleman W., or more frequently from any retail vendor who happens to have a few hundred to dispose of. Mr. M. in particular had frequently supplied such hawkers with oysters this summer.

There was thus sufficient evidence to show that almost all cheap oysters of foreign origin sold in Clacton by itinerant hawkers, or at stalls on the beach during the summer season, had come in one or another way from layings at Brightlingsea. Indeed, on inquiry of thirteen habitual vendors of oysters in Clacton, I learnt that in twelve instances all their oysters were obtained exclusively from Brightlingsea, the exception being a man who went to Wivenhoe as well as to Brightlingsea for his oysters.

By way of summary of this part of the inquiry, it may now be stated:—

(1.) That the particular oysters suspected of having been the agency by which the 26 persons came by their infection could in each instance but one (those supplied by Mr. U.) be affirmed, almost with certainty, to have come from layings at Brightlingsea; and that in five instances only was the evidence so far vague as to forbid the implicated oysters being referred to particular Brightlingsea merchants.

(2.) That there was reason to believe that the oysters implicated in respect of eleven sufferers by the fever had come from one or other of three owners of Brightlingsea oyster layings—Messrs. Z., X., or Y.; that the oysters implicated in one other fever case had been supplied either by Mr. Z., or by Mr. Y., or by Mr. V., another owner of Brightlingsea oyster layings; and that all the oysters implicated in respect of further nine cases of fever had been supplied by Mr. Z.

§3. *As to Oyster Layings in Brightlingsea Creek, and their liability to pollution by sewage, with special reference to layings believed to have furnished the Implicated Oysters.*

In 1895 Dr. Bulstrode visited Brightlingsea, a small town on the Essex coast with a population estimated at 4,000, in the course of his survey investigations as to the conditions under which oysters are cultivated and stored along the coast of England and Wales. In his report to the Local Government Board* upon this survey, Dr. Bulstrode gave a general description of the oyster layings of Brightlingsea Creek, particularly in regard of their liability to pollution by the sewage of Brightlingsea, which, without any preliminary treatment, was being discharged into the tidal water of the creek. He says:—

> "Brightlingsea Creek, which is formed by the junction of Flag Creek with a tidal stream from the village of St. Osyth, enters the River Colne a short distance beyond Brightlingsea. That part of the creek which is utilised for oyster layings extends from its junction with the Colne to the landward extremity of Cindery Island, which island hereabouts practically divides the creek into southern and northern portions.
>
> Within the limits mentioned are numerous oyster layings of varying dimensions, from which oysters are despatched direct to market; as an average the layings measure about 100 yards in length, their limits being marked out by beacons; in some instances the layings extend the whole width of the creek, in others only half the width. Near Brightlingsea ferry, where vessels are by common consent moored, and over a considerable area of the creek to the south of the seaward end of Cindery Island, there are no oyster layings; nor do layings extend on this side of the island eastward of Pincushion Island. As a general rule, foreign oysters only are deposited in Brightlingsea Creek, and at the time of my visit a large consignment of American oysters had just arrived, which oysters were being deposited on some of the layings. The oysters are laid down for varying periods from a few weeks to a year. During the winter months, as a general rule, such oysters as remain unsold are taken from the layings and deposited in wintering pits in the marshes near at hand. Near Brightlingsea ferry, on the town side, are

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* "Supplement to the 24th Annual Report of the Medical Officer of the Local Government Board (1894-95) on Oyster Culture in relation to Disease." Appx. No. 1, p. 40.

> two storage pits, constructed with cement floors and wooden sides, where the oysters of certain merchants are stored prior to sale.
>
> The sewage of Brightlingsea is discharged by three separate outlets on to the foreshore." [The positions of these three outfalls are represented at K., L., and M. in the map which accompanies this report.] "At the time of my visit, each of these outfalls was discharging offensive matter; the middle one, that passing through Mr. Stone's yard, being particularly offensive. Near to the points of discharge on the foreshore of the creek are numerous oyster layings, and at low tide the sewage may be seen emerging from the outfalls, and after passing over the mud, running along the back of the oyster layings hereabouts. Under these circumstances it is difficult to understand how the oysters near can fail to be polluted thereby. It may be added, too, that some of the oysters laid down in the locality just referred to are afterwards stored in the cemented pits to which reference has just been made, and it would seem that polluted oysters thus introduced into the pits might lead to the contamination of others.
>
> In reference to the sewage of Brightlingsea, it should here be remarked that some years ago it was proposed to carry an intercepting sewer to an outlet at Westmarsh Point, but this proposal was stoutly opposed by the fishermen, who advocated the carriage of the sewage to the marshes and its treatment thereon. There can be little doubt that the oyster layings near the Brightlingsea outfalls are in especial danger of sewage pollution, and Dr. Cook, the Medical Officer of Health of the district, has taken energetic steps to bring about a better state of affairs, but hitherto his efforts have been unavailing.
>
> Brightlingsea is a rapidly increasing town, and danger of contamination of oysters laid down here will tend to materially increase with the addition of new houses, unless steps are taken for the proper disposal of the sewage."

Dr. Bulstrode added to this account a footnote:—

> "Since writing the above, definite allegation" [*i.e.* in 1896] "has been made to the effect that enteric fever has followed on the consumption of oysters procured direct from the foreshore near the sewage outfalls of Brightlingsea. However this may be, there can be no question as to the risk to which oysters deposited on the Brightlingsea foreshore are liable."

When, in November of this year, I came to visit Brightlingsea Creek, and to inspect there the oyster layings, storage pits, and the three sewer outfalls, I found that the above description remained in all respects applicable to the conditions which obtained at the end of 1897. The oyster layings on the part of the foreshore near to the sewer outfalls, to which Dr. Bulstrode drew attention as being peculiarly liable to pollution, I have numbered 1 to 11 on the map which accompanies this report.

My next business at Brightlingsea was to ascertain the whereabouts of those layings which were particularly implicated. These were the layings of Messrs. Z., X., Y., and V. respectively.

The laying owned by *Mr. Z.*, I found, is that numbered 9 in the appended map. Mr. Z. informed me that from this laying he takes all oysters supplied by him to retailers or to middlemen.

The laying owned by *Mr. X.* is that numbered 11. Mr. X. also owns a storage pit near Brightlingsea Hard, in which he from time to time puts down oysters which have been collected from his laying No. 11, and which are ready for immediate sale. Mr. X. informed me that all the oysters which he sells have either just been collected from laying 11, or they have come from this laying by way of the storage pit. Oysters supplied in any quantity to wholesale purchasers are almost always taken direct from laying 11 and not from the storage pit.

Mr. Y., I found, acts as agent for the owners of certain oyster layings in Brightlingsea Creek. But such oysters as he had sold to Mr. N. or to Mr. J. had come from his own layings in Geetons Creek,* on the side of the estuary of the Colne opposite to Brightlingsea. I learnt, however, that as the labour of fetching oysters from Geetons Creek is considerable, it was Mr. Y.'s custom to bring over a considerable quantity at a time, and to deposit them, until sold, on a part of laying 11, which belongs to his father, Mr. X. This year he had not, except occasionally, made use of Mr. X.'s storage pit for this purpose.

The laying owned by *Mr. V.*, I found, is that numbered 13 on the map. This laying is thus not comprised in the series which appeared to Dr. Bulstrode and to myself to be peculiarly liable to sewage contamination. Nevertheless, in common with other layings situate in that part of the creek which is above the sewer outfalls, laying 13 must be considered as in a measure exposed to risk of sewage pollution at a time when the tide is flowing, and particularly when it first begins to flow. It will have been observed however that oysters supplied from Mr. V.'s layings came into question only in so far as a particular batch of implicated oysters had been ascertained to have been obtained from one or other of the three merchants X., Y., or V.

It may be useful if I here give some brief details which may assist the reader in forming some notion as to the amount of dilution which Brightlingsea sewage may be thought to have undergone by the time it reaches oysters upon the series of layings Nos. 1 to 11.

At high tide, the whole of Brightlingsea Creek, which opposite the sewer outfalls has a breadth of between 300 and 400 yards, is filled; the oyster layings are completely submerged; while any sewage escaping from the outfalls must needs at once undergo very great dilution.

At *an ordinary low tide* the conditions are somewhat as follows. The water in the creek has narrowed to a breadth of some 80 yards, and a strip of oyster beach, about 700 yards in length, can now be seen along the northern edge of the water. This oyster beach is a hard bed which has been made up with timber, oyster shells, and other material. Its breadth is seen to be composed of two portions: one the portion which is higher than low water mark of ordinary tides, the other the portion which habitually remains submerged at low water. In the case of the strip of beach comprising layings 8 to 11, a breadth of between 50 and 100 feet is usually left dry when the tide is fully out: only a small part of the breadth of the layings nearer to the mouth of the creek becomes uncovered at the lowest point of an ordinary tide. Nominally, the submerged portion of each laying extends to mid-channel, but in practice, oysters are not laid quite so far as the centre of the creek.

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* Dr. Bulstrode reported that oyster layings in Geetons Creek, like those of the Colchester Oyster Company in the neighbouring Pyefleet Channel, were practically free from risk of sewage pollution.

Between this firm oyster beach and the land there is now, at low tide, a foreshore composed of soft mud. Sewage emerges from the three outfalls K., L., and M., and in part mingles with the mud, and for the rest finds its way by ever shifting channels over the mud to the northern edge of the oyster beach. At a few points where this edge is no higher in level than the mud, sewage is liable to trickle on to the beach and so to come directly into contact with oysters there. In most places, however, the edge of this beach is raised some few inches above the level of the mud, and near such places sewage either accumulates in pools, or it flows along sundry mud channels which fringe the northern edge of the beach until it reaches some point or points at which it can traverse the beach and so pour into the water of the creek. Shallow troughs or "grips" have been made across the oyster beach at two points marked A and B in the map, in order to facilitate the necessary escape of sewage. Through grip A a considerable portion of the sewage from the principal outfall K finds its way. At the time of my visit it appeared that sewage from all three outfalls made its way to grip B.

Now, the period during which oysters are collected for market from this beach is essentially the two or three hours between the time when the beach begins to be uncovered on the ebb and the time when it becomes submerged by the flowing tide. From the description I have given, it will be readily apprehended that during every such period oysters lying upon this beach are liable to contamination by sewage which is in no extreme degree of dilution.

For, firstly, at low tide, and for about an hour on either side of it, those oysters which are submerged lie in shallow water; either slack, or, as is the case on the north side of Brightlingsea Creek, with a comparatively slow upward or downward current. Sewage, conveyed across the "dry" part of the beach by way of the "grips" or otherwise, is continuously mingling with this water, and thus during the period in question the submerged oysters must in effect be regarded as lying in dilute sewage.

And, secondly, a notable opportunity of pollution occurs whenever the flowing tide has risen to a point where the water just covers the mud to the north of the oyster beach. For then the sewage which during the ebb has accumulated at the back of the beach is, as it were, lifted on to the top of the oyster layings there.

§4. *Access to Brightlingsea sewers of infectious matters from Enteric Fever Patients.*

In November, 1897, I ascertained from Dr. Cooper, Medical Officer of Health of Brightlingsea Urban District, that since the beginning of the year he had received information, through the provisions of the Infectious Disease (Notification) Act, that a total of eight persons in the town of Brightlingsea had suffered from enteric fever. The occurrence of two of these cases had been notified to him in April, one in May, one in June, two in September, one in October, and one in November. Brightlingsea does not possess hospital accommodation for infectious cases, and hence these eight persons had in each instance been treated at their homes. I have indicated on the accompanying map the position of the seven dwellings wherein these cases occurred. Certain of these dwellings, Dr. Cooper informed me, are served by water closets, others are not so served. Six of the seven are provided with gullies for the reception of slop water from the dwelling. Each of the water closets and gullies in question is connected with one or other of three systems of sewers in the town, each system, as has been indicated, having a separate outfall into Brightlingsea Creek.

Hence there can be no doubt that from time to time, between April and November, Brightlingsea sewage contained admixture of infectious matters derived from enteric fever patients. Moreover, the illness of one of these persons occurred at a time and in circumstances not inconsistent with his bowel discharges having got access to oysters which were distributed at Clacton and St. Osyth during the last week of August and the first weeks of September. This patient was a man, F. S., dwelling in a house at the south end of Sydney Street, facing the Creek. On September 1st F. S. was notified to Dr. Cooper as suffering from enteric fever. His illness, I learnt, had begun ten days or a fortnight before this date. Mr. F. S.'s house is served by a water closet and by a yard gully, by way of which infectious excreta and slop water were disposed of, without previous disinfection, during the first fortnight of his illness. Water closet and gully discharge their contents into the Sydney Street sewer, at a point not more than 70 yards above its outfall at M.

Summary and Conclusion.

It will have been gathered from the first section of this report that the facts obtained with regard to the 26 cases of enteric fever which I had under consideration had afforded definite indication that each of the persons in question owed his attack to the ingestion of infectious oysters:—an indication arrived at independently of any question of the origin of the implicated oysters or of their history prior to their being swallowed by the sufferers. Reviewing the facts set out in the subsequent sections of my report, it now appeared:—

(1.) That in at least 25 instances the implicated oysters could be referred, almost with certainty, to layings in Brightlingsea Creek.

(2.) That though in five of these instances the particular Brightlingsea laying or layings which had furnished the implicated oysters could not be ascertained, the facts as regards the remaining 20 instances were sufficient to warrant inference that the implicated oysters had been taken, prior to their delivery to their respective vendors, from one or other of two particular layings in Brightlingsea Creek.

(3.) That the two layings thus implicated formed part of an oyster beach, which is situated on the foreshore of Brightlingsea Creek, close to the outfalls of the three main sewers of the town of Brightlingsea: a foreshore which is conspicuously exposed to pollution by sewage.

(4.) That at sundry different periods in the course of 1897 infectious matter derived from persons suffering from enteric fever at Brightlingsea must needs have been discharged from the Brightlingsea sewer outfalls.

In view of this strong presumption that during the summer and autumn of 1897 oysters from certain Brightlingsea layings had from time to time been the means of conveying enteric fever infection to persons who had consumed them at Clacton-on-Sea, at Walton-on-the-Naze, and at St. Osyth, the question arises—to what other places during the same period have infected Brightlingsea oysters been distributed, and what the amount of mischief which they have caused to persons consuming them? But to this question I can give no answer. To attempt to follow to their consumers in different parts of the kingdom oysters which have been collected from the layings of a number of separate oyster merchants day by day for a series of months was an obviously impossible task. But in view of the following considerations, there appeared some ground for inference that from time to time persons other than those whose cases I investigated had swallowed infectious Brightlingsea oysters, and as a consequence had been exposed to definite risk of contracting enteric fever.

(*a.*) During the summer and autumn of 1897 large numbers of Brightlingsea oysters had been consumed at Clacton-on-Sea by visitors. Now such visitors had come from many parts of England: a large proportion, in particular, from London. It was hardly to be presumed, therefore, that if at times certain of the Brightlingsea oysters which were being sold at Clacton were infectious, infectious oysters had been ingested solely by persons dwelling in the six sanitary districts of Essex and Suffolk to which my inquiry was restricted. Moreover, during the whole period in question oysters from the Brightlingsea layings particularly implicated had been frequently dispatched, not only to Clacton, but also to several other parts of England.

(*b.*) The oyster beach on which layings 9 and 11 are situate comprises nine other layings, and oysters laid on any portion of this beach must be regarded as being similarly subject to sewage pollution. Inferentially, therefore, at such times as Brightlingsea sewage has happened to contain infectious matters from enteric fever patients, not two layings only, but all eleven, have become exposed to risk of specific pollution. And it deserves to be noted that if at any time during the period in question oysters from layings 1 to 8 and from laying 10 have as a matter of fact proved infectious to persons consuming them, the fact would not have transpired at my inquiry. For of these layings, 1 and 2 are practically disused, layings 3 to 9 are owned by one London merchant, and laying 10 is owned by another. Neither of these London merchants, I was informed, does business with local middlemen or with other dealers who trade in Clacton-on-sea, Walton-on-the-Naze, or St. Osyth.*

Lastly, as to measures of precaution. It is obvious that until the sewage of Brightlingsea is satisfactorily dealt with (as for instance by proper filtration through land), or has been made to discharge outside Brightlingsea Creek altogether, risk of the kind I have indicated must continue to attend the consumption of oysters from

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*I may here record that since the date of my inquiry I have incidentally learnt that two cases of enteric fever, occurring in the second week of September at a house in Trewint Street, London, have been referred by Dr. Caldwell Smith, Medical Officer of Health for Wandsworth, to oysters which the patients had consumed at Clacton-on-Sea on August 23rd. I have also learnt from Dr. Brown, Medical Officer of Health of the Borough of Colchester, that four cases of enteric fever (three of which proved fatal), occurring in Colchester in October, 1897, had been referred by him to Brightlingsea oysters, which, he ascertained, had in each instance been consumed about a fortnight before the onset of illness.

APP. A. No. 6.

On the Occurrence of Enteric Fever in East Anglia in relation to Oyster Consumption; by Dr. Buchanan.

layings there. As has been shown, this was the view taken by I
Bulstrode as a result of his observations in 1895. And as I
Bulstrode pointed out in his Report to the Board, the Council of t
Tendring Rural District, in which, up to 1896, the town of Brightli
sea was comprised, have been in past years repeatedly urged by th
Medical Officer of Health, Dr. Cook, to provide a scheme of sewers
which should comply with these conditions. Nevertheless, no wo
which will divert Brightlingsea sewage from Brightlingsea Creek a
its oyster layings have yet been begun. It may however be not
with satisfaction that the recently-created Brightlingsea Urb
District Council are giving serious attention to the matter, and a
endeavouring to compass a scheme sufficient for dealing in this se
with the sewage of the town.

January, 1898.

No. 7.

On an OUTBREAK of ENTERIC FEVER at KING'S LYNN; by Dr. F. ST. GEORGE MIVART.

APP. A. No. 7.

On Enteric Fever at King's Lynn; by Dr. Mivart.

On the 20th of October, 1897, Mr. S. M. W. Wilson, Medical Officer of Health for the Borough of King's Lynn, reported to the Board that enteric fever had broken out in the Borough. He stated that since the 1st of October, 22 cases had occurred, with two deaths. Three days later, Dr. C. B. Plowright, Medical Officer of Health for the Rural District of Freebridge Lynn, reported an outbreak of enteric fever in the village of Gaywood, which is continuous with the Borough of King's Lynn. In Gaywood, seven cases had so far occurred. In consequence of these communications, the Board requested that the Town Council of King's Lynn would instruct their Medical Officer of Health to prepare a detailed report upon the subject of the fever there. This further report was received by the Board on the 25th of October, 1897, and as it appeared that the number of attacks had amounted to 114, and that the outbreak was extending, I was instructed to forthwith visit the Borough in order to inquire into the circumstances with which the disease was associated. At the same time I was to make similar inquiries respecting the outbreak in the village of Gaywood.

In June, 1892, Dr. Bruce Low investigated an extensive outbreak of enteric fever in the Borough of King's Lynn and the neighbouring village of Gaywood. He reported that from January to June, 1892, 135 recognized cases of that disease had occurred in the town and suburb, with 15 deaths; and that the fever had been undoubtedly disseminated by means of the King's Lynn public water service, which was common to both places. He advised that until a pure supply of drinking water had been obtained, the inhabitants should boil the water before using the same for drinking purposes.

Since the date of Dr. Low's report, in no single year have both King's Lynn and Gaywood been free from enteric fever, as is indicated by the following table:—

	1892.		1893.		1894.		1895.		1896.	
	Fever cases.	Fever deaths.	Fever cases.	Fever deaths.	Fever cases.	Fever deaths.	Fever cases.	Fever deaths.	Fever cases.	Fever deaths.
Borough of Lynn (Population*) 18,360.	131	19	50	3	34	4	27	4	26	6
Parish of Gaywood (Population*) 952.	14	1	2	0	2	0	0	0	1	0

* 1891 Census.

The general sanitary circumstances of King's Lynn and Gaywood were fully dealt with by Dr. Bruce Low in his report of 1892. In view of the recent date of that report, and of the fact that the conditions in the above respect are substantially the same as when he visited the place, I do not propose to deal with the sanitary circumstances of the localities, except in so far as is necessary in considering the causation of the present outbreak.

The History of the Epidemic of 1897.

APP. A. No. 7.

On Enteric Fever at King's Lynn; by Dr. Mivart.

Unlike the outbreak of 1892, the recent enteric fever in Lynn and Gaywood does not seem to have been preceded by any notable prevalence of diarrhœa. The various medical practitioners of Lynn with whom I conferred were unanimous on this point. They consider the general health of the town to have been especially good this year up to and during September, in which month the number of cases of enteric fever for the first time exceeded the monthly average for the preceding three years.

The following table shows month by month, from January 1st to November 30th, 1897, the ascertained number of houses in Lynn and Gaywood invaded by enteric fever, with the total known attacks, and the deaths in such houses.

1897.	Houses invaded by enteric fever.	Total attacks in such houses.	Deaths from enteric fever.	—
January and February	2	3*	—	*Two other cases of enteric fever were treated in the Borough, viz., two men who were landed from the S.S. "Alf."
March	2	2	1	
April	3	3	—	
May	2	2	—	
June	2	2	—	
July	4	5	1	
August	2	2	—	
September	9†	9†	1	
October	255*	303‖	9	
November	96‡	141§	34	

† 1 in Gaywood. * 10 in Gaywood. ‡ 4 in Gaywood.
‖ 11 in Gaywood. § 7 in Gaywood.

The next table gives in successive periods from September 1st, 1897, to the 30th November, 1897, the number of houses invaded by the fever in Lynn and Gaywood, with the number of cases in such houses.

—	Successive fortnights ended on						Week ended
	Sept. 14.	Sept. 28.	Oct. 12.	Oct. 26.	Nov. 9.	Nov. 23.	Nov. 30.
Houses invaded	4	4	5	183	139	23	2
Cases	4	4	9	214	172	42	8

The above tables serve to exhibit the suddenness of the epidemic. In 1897, to the end of August, Lynn and its neighbourhood suffered no more than the customary amount of enteric fever. Next, during successive fortnights of September, and in early October, this disease became twice to three times as prevalent as in any previous month of the year. Then occurred an extraordinary outbreak of enteric fever. In the fortnight ending the 26th of October, fever in Lynn and Gaywood increased 30—40 fold, and maintained during the next

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succeeding fortnight a nearly equal degree of prevalence. Afterwards it quickly declined; so that by the beginning of December, the epidemic as such was practically at an end. In all, there occurred in Lynn and its neighbourhood between 1st September and 30th November, 453 cases and 44 deaths referred to enteric fever; an attack rate by the disease of 23·45, and a death rate of 2·28 per 1,000 of the census population.

And not less remarkable than the suddenness of this epidemic was the indifferent distribution of the fever throughout the place. As to this, the behaviour of the disease has been very carefully studied. There has been plotted, month by month, from January to August, later on fortnight by fortnight, on separate large scale maps, each reported case of enteric fever; and as a result, it has been found that not until the disease had become fully established as an epidemic was there the least tendency to grouping of cases. As in the first eight months of the year such fever as occurred had been widely distributed over the place, so also through September and the greater part of October, inclusive of the great outburst in the second fortnight of that month, the disease was, so to speak, broadcast over the whole district; spread abroad, that is, in a fashion inconsistent with the operation, before late October, of any agent of fever dissemination that had not a range co-extensive and co-terminous with the total area of combined Lynn and Gaywood.

Age Incidence.

I have constructed the following table setting forth the incidence of the fever, in so far as could be ascertained, upon various age-groups during the present outbreak.

Age group.	Number of persons attacked by enteric fever.	Number of deaths from enteric fever.	Number of deaths per cent. of attacks.
Under 5 ...	42	2	4·8
5—10	79	3	3·8
10—15	100	5	5·0
15—25	118	12	10·2
25—35	37	3	8·1
35 and upwards... ...	29	6	2·1
At all ages	405	31	7·7

Cases Regarded as Doubtful.

As in all epidemics of enteric fever, certain cases of a mild character were brought to the notice of the Medical Officer of Health, and locally suspicions were entertained that many cases had been notified which were not enteric fever at all, but "influenza." I have, however, satisfied myself that there was no sufficient ground for such belief. I should be disposed on the other hand to think, having regard to the number of instances in which no medical aid was sought until the illness of the person was far advanced and the gravest symptoms were apparent, that not a few cases of mild enteric fever escaped notice altogether. Reluctance to admit the presence in their houses of illness was especially manifested by persons engaged in trade and business.

CAUSATION OF THE EPIDEMIC.

In seeking explanation of the epidemic, it has to be borne in mind that the outbreak occurred suddenly; that it appeared simultaneously in the town of Lynn and its suburb Gaywood; and that from first to last (especially in the fortnight of its chief incidence) the fever was distributed throughout the length and breadth of both places. Outbursts of enteric fever such as this—so sudden and so widespread throughout a large and populous area—have again and again been referred on incontestable evidence to specific pollution of public water supplies. In the particular instance, the past history of Lynn and Gaywood, along with the facts respecting their present fever and their circumstances at the date of my arrival in the place, afforded a strong presumption that the epidemic was due to the faulty character of the public water service. I did not, however, accept such presumption, preferring rather to examine, as matter of first instance,, other accredited agents of enteric fever, some of which had been thought of locally as quite as likely as the water supply to be responsible for the fever which was occurring. In this way I came to be concerned with (1) sewerage and drainage, (2) general sanitary circumstances, and (3) milk supply, as possible causes of the outbreak.

Sewerage and Drainage.

Dr. Bruce Low in his report on an outbreak of enteric fever, of a very similar, though less extensive character, at King's Lynn, in 1892, thus describes the sewerage of Lynn: —

> "The public drainage consists, in the older parts of King's Lynn, of short sections of brick sewers, constructed some years ago and discharging by different outfalls directly into the Ouse, or into one or other of the Fleets. For the northern and eastern part of the town a long length of sewer was, a few years ago, laid down. This sewer, which receives the sewage of more than half of the houses in the town, has an outfall near the old dock, and is generally known as the "dock culvert." For a considerable distance it is an egg-shaped brick sewer, and throughout it is ventilated at intervals by openings at the street level. Here and there shafts have been carried up above the level of the house roofs. There are several automatic flushing tanks at the ends of branch sewers. Few of the sewers appear to be self-cleansing. Deposit takes place in nearly all of them. The tide dams up the sewage in all for several hours daily. Private drainage is effected by ordinary pipe drains. Gullies in yards are mostly trapped. Rainfall pipes usually pass directly into the drains. In some cases sink pipes are not disconnected, but the majority of houses have no sinks indoors. Soil pipes in some cases are ventilated; much improvement in this respect has been effected of late."

And as regards Gaywood, he says:

> "The sewers of King's Lynn extend into the village of Gaywood. There are roadway ventilators along the main sewer, and a flushing tank is situated at a point where the sewer from Gaywood joins the borough main sewer."

As regards sewerage, the above description may be taken as describing to a very large extent the present condition of Lynn. Certain lengths of brick culvert sewer which were especially defective, have been replaced by pipe sewers, but the general arrangement remains the same, and the sewage is still tide-locked for several hours daily. When an exceptionally heavy rainfall occurs at the time the sewers are thus closed by the tide, more or less extensive flooding is caused of streets, yards, and even of houses.

Now, two most conspicuous instances of flooding in Lynn occurred on the 9th of August and on the 29th of September of the present year. On the former occasion, a local rain gauge recorded 3·4 inches of rain in 24 hours, and on the latter 2·25 inches were registered in the same period.* On both these occasions in several parts of the town extensive flooding occurred, water bursting up from gully and drain openings and gradually invading houses to a depth of several inches. In many instances, complaints were afterwards made to me as to the foul smell of this water, which in some cases was almost black and left a deposit of black mud. It was inevitable that this coincidence of heavy rainfall and flooding should be associated locally with the fever epidemic which followed, and, indeed, local opinion was in the right in referring the fever in some sort to exceptional rainfall; though, as will be seen later on, the latter is not to be thought of as operating through the sewers. Perhaps the worst flooding occurred in the vicinity of the thoroughfare known as Windsor Road. The dwellings here are of a poor class, one storied cottages. I was, however, unable to detect any special incidence of the outburst of fever on this neighbourhood. Not until the epidemic had become fully established did the cases notified in this locality appear to be, on the whole, more numerous than greater density of the population hereabouts could fully account for; and very possibly the unsanitary conditions of the area in question, enhanced as they must have been by the flooding to which it was subjected, may have conduced to exceptional spread of fever in this neighbourhood after the disease was implanted there on the occasion of the initial outburst in mid-October. However this may be, similar floodings occurred in other localities, in which there was no noticeable excess of fever over that observed in other parts where no flooding whatever had occurred. Moreover, I was unable, after careful examination, to discover that there was any special grouping of cases upon the course of any particular sewer or sewers. Further, the incidence of fever on houses draining to the old type of brick culvert sewers was in no way different from that observed on houses draining to the recently laid pipe sewers. The conclusion cannot therefore be avoided that faulty sewerage and drainage are not responsible for the sudden outburst of enteric fever.

General Sanitary Circumstances.

Mr. W. Whitaker, F.R.S., the eminent geologist, in a report dated 15th October, 1892, to the Waterworks Committee of the Lynn Town

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* Both the above observations were made in Lynn itself, and surprising though the records (especially that relating to 9th August) may seem, there is no reason to doubt their substantial accuracy. From independent evidence, however, it appears that the rainfall of 9th August was, so far as its very exceptional amount is concerned, limited practically to Lynn, whereas the exceptionally heavy rainfall of 29th September was widespread, affecting a very large tract of country on all sides of the town.

Council on a proposed new source of water supply, thus describes the subsoil of the borough and its immediate neighbourhood: —

> "A thick mass of clay underlies the marsh silt that forms the surface, not only in the town itself, but also in the greater part of the neighbourhood, where this (and other alluvial beds) have a wide spread along the main valley, with comparatively narrow inlets up the tributary valleys. These clays have been proved by a boring in the northern part of the town to go down to a depth of 680 feet, and then without reaching the bottom, leaving it uncertain how much deeper clay may go."

Dr. Bruce Low, in his report, thus refers to the dwellings in the borough: —

> "Many of the streets in Lynn are narrow, and in certain quarters there are courts or yards thickly populated and entered by narrow passages. These courts or yards, many of which are unpaved, are frequently surrounded by high walls which exclude sunlight and prevent free circulation of air. Dwellings in these courts are not unfrequently in bad repair, and they tend to be overcrowded. In business quarters of the town, for instance, in King Street, parallel with the river front, and in the more recently built parts of Lynn, the streets are more open and houses are larger and of a better class."

There is crowding of houses upon area at certain points, but I met with no instances of overcrowding of persons. There is no doubt that the Sanitary Committee have effected improvements since the last epidemic of enteric fever in 1892. In many of the closest and most crowded courts and alleys, I found that water-closets, fitted with flushing-cisterns, had been provided, though, it must be added, not a few were out of order and in a foul condition.

It is also still the fact that, as stated by Dr. Low in his report, in some courts the closet accommodation is inadequate, and the privies are too close to the dwellings. Notable instances of this were seen in the vicinity of Windsor Road. Leading out of this thoroughfare are certain streets of cottage residences, many of which had cesspit privies in a foul condition. Moreover, the backs and sides of the brickwork are not rendered in cement, and in some cases I detected cracks which must allow free soakage from the privy into the adjoining premises.

The arrangements for the emptying of privy pits are very defective. Upon the application of the householder, the contents of cesspits are removed in iron tank carts belonging to the Corporation. As Dr. Low observes: "In the process of emptying some privy pits the contents have to be carried through the houses."

Nevertheless, I did not find that the incidence of the fever had been heavier upon the inhabitants of the worst class of dwellings, or that the epidemic outburst in October had specially affected the least wholesome quarters of the town. Up to the date of my last visit, I found that not a few of the closest courts and alleys had either altogether escaped the visitation, or that at most single cases, often of a mild type, had occurred in them. On the other hand, on certain residences, which could not be classed among those styled poor, the incidence of fever had been very severe. In particular, I visited two dwellings, of the superior type of small house, in each of which five cases and one death had occurred. In neither of these houses were conspicuous sanitary defects to be found. The water-closets were

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outside the houses, and the only defect worthy of note was that in one case the scullery waste-pipe (which was not trapped) delivered outside the house, too close to the gully hole, the exit of the waste-pipe being actually below the " grid " covering of the gully. But as this was open to the air, it could not be contended that there was direct communication with the sewer. As I have said, upon the whole there was absence of any evidence that general sanitary circumstances had been responsible for the simultaneous appearance of cases of enteric fever throughout the district.

As illustrating the non-concern of insanitary circumstances with, at any rate, the inception of the epidemic, a table is appended, making comparison of the incidence of the fever on dwellings served by privies and on dwellings served by water-closets.

Months of 1897.	Houses invaded by Enteric Fever.					
	Provided with Privies.		Invaded, per cent. of total.	Provided with Water Closets.		Invaded, per cent. of total.
January and February...	Total dwellings served by privies, 844.	2	0·6	Total dwellings served by water closets, 3,290.		0·6
March					2	
April					3	
May					2	
June		1			1	
July		2			2	
August		1			1	
September					8	
October		52	9·2		193	7·9
November		26			66	

Milk Supply.

A very brief inquiry was sufficient to set aside the suggestion that milk had been the means of conveying the disease. There are 45 dairies and milk shops in King's Lynn and Gaywood. I inquired as to the source of milk supply in respect of 150 households taken haphazard as invaded in the early part of the outbreak. I found that 37 different milk dealers had supplied the household in which these cases occurred Of these dealers, each of two had on his list 13 out of the 150 of invaded households; one dealer had 11 names upon his list; three others had each nine; and two others had each eight. I learnt that the rest of the invaded households had been supplied, in fairly equal proportion, by the other 29 milk dealers. This sufficed to indicate that the milk supply of King's Lynn had not been the principal, or indeed an important, factor in the dissemination of enteric fever in the borough.

The Public Water Supply, in its relation to the Epidemic.

The above-mentioned possible agencies of fever dissemination having been put aside as in no case having had any important concern in the epidemic, my attention was directed to the water supply.

The Borough Surveyor informs me that of the 4,161 inhabited houses* in the borough only about 40 have a water supply independent of the Corporation works. As at the time of Dr. Bruce Low's visit, the town supply is still derived from the Gaywood river. The sources of this river are thus described by Mr. W. Whitaker in his report to the Waterworks Committee of the Lynn Town Council of October, 1892:—

> "The head-waters of the stream from which Lynn gets its supply are derived from springs that flow out of the base of the Chalk, the water in which formation is held up by the underlying impermeable Gault.
>
> "These streams are the result of the rainfall over the broad Chalk tract rising to the east. Much of the water falling on the Chalk sinks into it, and of this a part finds its way downward, until at some depth the Chalk is saturated and can hold no more. The level of saturation varies roughly with that of the ground, being higher at the hills on the east than at the slope toward the outcrop of the underlying Gault; the reason of the difference of level being the frictional resistance to the flow of the water through the Chalk. The underground water slope in the Chalk of the immediate neighbourhood being westward, the springs are therefore merely the natural outflow of the water-charged Chalk, the water finding its way out at the lowest available places, the slowness of percolation through the rock making the springs constant, though of course varying in amount, instead of their being very great at one time (after heavy rain) and dry at another, as would be the case if the water flowed through quickly."

The water of these springs is, no doubt, of satisfactory quality, but it is unfortunately polluted at or near to its sources. Two of the three principal sets of springs rise amidst foul surroundings. The northern set at Grimstone, as Dr. Bruce Low pointed out, rise directly from beneath the churchyard. Another, and perhaps the most important, set of springs, rise upon and around the slope whereon stands the farmstead known as Well Hall. The state of affairs at this point was five years ago thus described by Mr. Whitaker:—

> "The southern, and apparently the most powerful, set of springs at Well Hall, seems to be looked on as the fit receptacle for all the filth of the farmyard. One building is directly over a spring, the water of which may be seen oozing out from under the outer wall. At the time of my late visit a liberal allowance of muck, of which I did not care to make a minute examination, had been thrown down about as near as possible to others of the many springs here."

The above description depicts accurately the state of things at Well Hall at the time of my visit. As if these sources of pollution were insufficient, I found at that date an immense heap of refuse and farm manure close to the edge of the stream. The inhabitants of two cottages, situated just below this point, obtain water by "dipping" from the stream, and the enormous quantity of mussel shells thrown upon the very edge of the stream immediately adjacent to this "dipping" place is significant of the indifference of the population of the district to the purity of their water supply.

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* 1891 Census.

To describe in detail the various pollutions which by way of divers tributary streams reach the Gaywood river in its course from the spring to within a mile or so of its intake at Gaywood village, would occupy a great deal of space.

The subject is thus dealt with by Dr. Bruce Low, in his report:—

> "The feeders of the river receive more or less directly the slop water of Grimstone village, while soakage from privy pits and refuse heaps, as also drainage from farmyards and horse-ponds sooner or later find their way into these tributaries. Two of the springs rise directly from beneath Grimstone churchyard. In addition to the above sources of impurity, the slop waters from the hamlets of Roydon, Bawsey, and Pot Row similarly find their way ultimately into the stream. At Grimstone, and again at Roydon, I saw the overflow pipe of a cesspool, receiving contents of water-closets, discharging into a water-course which flows into the Gaywood River. Similarly, the drains from a slaughter-house, a public-house urinal, and the washings of a laundry empty into watercourses which discharge directly into the stream."

In this respect matters remain as at the date of Dr. Low's visit in 1892, and in what follows I do but illustrate the dangers to which the river water is thus exposed. Among the sources of serious contamination of the river is a brook falling into it, about two miles from the intake of the Public Water Supply. This brook receives from a ditch the drainage from the farmstead of Waveland. The privy arrangements at the farm are very defective, and the overflow from the privy pit appears to mingle with the drainage from the farmyard and slop-drain. The farmhouse is in the occupation of two families. I was informed that in one of them there had been repeated attacks of diarrhœa during the past summer. Great complaint was made here of stench from the house drain; and as matter of fact at the time of my visit this house drain was being cleared out, whereby the flow of foul liquids into the brook, and thus to the Gaywood River, was being rendered more direct.

Coming now to Gaywood Village, a mile or so above the intake of the Town Water Supply, the river flows by gardens which abut upon the river. Here in the course of my inspection I discovered several privies placed actually upon the brink of the stream. It is true that in several instances these privy structures were provided with pails said to be emptied upon the gardens from time to time; but there can be no doubt that even their presence in such situation conduces to risk of fæcal matters being washed out into the stream at seasons of heavy rain.

Adjacent to the village of Gaywood are certain ditches which are only prevented from communicating directly with the river by a thin barrier of clay puddele. These ditches receive drainage from refuse heaps, backyards, a small farmyard, and also the liquid soakage from privies, and in one case the drainage from a patch of kitchen garden upon which, previous to the heavy rainfall of September 29th, the contents of a large cesspool had been emptied. Though these ditches are in ordinary circumstances prevented by the thin barrier of puddle from communicating with the river, there cannot be the slightest doubt that on the occasion of heavy rainfall they become bank full, and overflowing their dry puddle barriers pour their accumulated foulness into the river.

At the intake of the water works the river water flows through earthenware pipes directly to the settling pond or reservoir known as the Long Pond. Between the river and the pond these pipes are at a varying depth beneath allotment gardens which are largely the property of the Corporation. Having ascertained that these conduit pipes had not been examined for an unknown period of time, variously estimated at from 10-20 years, I had the ground opened over them, close to the intake. The pipes were reached at a depth of a little over three feet, and were found to be leaking so freely at the joints that a pump had to be employed in order to get rid of the escaping water and enable the work to be continued. The pipes are not bedded in concrete, but lie in clay, covered by thick heavily manured garden mould. A few feet from this spot the tenant of a garden was in the habit, as he informed me, of emptying every week the contents of a privy pail.

In the Long Pond the water has ample facilities for further pollution from the washing into it of surface refuse and the soakage to it of liquid from the heavily manured allotment gardens which come down almost to its brink. From a refuse heap, close to the pond, I observed the clearly marked course of a stream which in time of rainfall had flowed into the pond. As there is a public 'right of way' along one side of this pond which gives access to the allotment gardens, it is impossible to exclude children from the locality. And I was informed that in consequence of the habit they had of paddling with their feet in the water a watchman had at certain times to be posted at this spot.

From the Long Pond the water flows—still by gravitation—to the so-called filter-beds. These are really only straining tanks, and occupy an area of a little more than 200 square yards. These tanks are still as they were when Dr. Bruce Low saw them. He says:—

> "The filtering materials consist of a layer of coarse gravel about 18 inches thick, and a layer of fine gravel about 14 inches thick. The surface of the filtering material is roughly cleansed once a week by stirring it about with strong brushes, and thus detaching accumulated dirt, which is allowed to flow off into the river below the intake."

From the tanks the water flows into a well below the pumping engines to be pumped direct into the mains, and also into a tank upon the top of a tower, whence, during the temporary cessation of the pumping engines, it flows by gravitation to the town. It thus appears that the water furnished to the inhabitants of the town has now, as at the date of Dr. Bruce Low's report, "multifarious opportunities for becoming polluted by human excrement, not to speak of other impurities directly discharged into it or washed into the stream by heavy rains or melting snow." The opportunities referred to are afforded, firstly, at the source of the river; secondly, in its course to the intake; and, thirdly, at the waterworks themeslves.

As was inevitable in the circumstances, the quality of the Gaywood River water has again and again been called in question. Dr. Bruce Low, reporting on it in 1892, states that:—

> "Some people in Lynn complain that after heavy rains the water is thick and discoloured, and that if allowed to stand it deposits a sediment, and occasionally 'stinks.' Sometimes a dead eel or a small frog is found stuck fast in the water pipes."

The same complaints as to the water are still freely made. I was informed by several residents of the town that after heavy rain the water becomes so thick that it is impossible for a person taking a bath to see his own legs in the water, which is of a brown colour. Another resident informed me that quite recently there had been what he called "an epidemic of small leeches in the water." It appears that in the ditches and dykes about Grimstone a great quantity of small leeches are found. Those that are supplied to the inhabitants of the borough in their drinking water are of an average length of half-an-inch.

Chemical testimony, when appealed to, has been almost uniformly hostile to this water. In June, 1892, Dr. Percy Frankland, reporting on a sample of the Gaywood River water, collected at a point near the waterworks intake, says, in regard to the organic matter detected by him therein, that it "may be of animal origin, and from your (the borough surveyor's) description of the surroundings of the stream it is obvious that the latter must be subject to contamination with animal refuse, more especially after heavy rains. The drawbacks of such a supply are sufficiently apparent." Later on in the same year, Dr. P. Frankland says, of another sample of the same water, "that organic matter and albuminoid ammonia are more than twice as great as in the previous sample from the same source, thus clearly showing how the stream in question is liable to excessive pollution during heavy rains." So, too, Mr. West Knights, the Public Analyst for the counties of Cambridge and Hunts, who, in 1893-94, examined no less than eight samples of the water in question, has condemned it on each occasion as "unfit for drinking purposes." His least unfavourable report, as to any one sample, is thus expressed: "The water contains organic matter, and is not satisfactory as the source of a public water supply, but I should not go so far as to say that it is absolutely unfit to drink."

Local medical opinion long since utterly condemned the water, as will appear from the following which was published in the Lynn newspapers in 1893:—

"Brought as we are into daily contact with sickness and suffering, "we keenly feel how lamentable is the amount of preventible disease "which exists amongst the inhabitants of the town. Probably no "single cause operates more potently in producing this than our "impure water supply. Whilst freely admitting that the improvement "of our water supply may entail an addition to the rates, we cannot "think, even from a pecuniary point of view, this is for one moment "to be compared to the advantages we should derive from an abundant supply of pure and wholesome water.

"To take only one water-spread disease, namely typhoid fever, "it is a noteworthy fact that the last epidemic, which unfortunately "still lingers amongst us, cost our Board of Guardians £149 16*s.* 8*d.*, "and has left us widows and orphans whose permanent support "amounts to £43 15*s.* 4*d.* annually. The victims were, however, by "no means confined to the recipients of parochial relief. Altogether "131 cases occurred, of whom 21 lost their lives, besides which there "were notified 107 cases of continued diarrhœa, considered to have "been abortive typhoid. Each case of typhoid fever incapacitates the "patient from work for a period varying from six weeks to three "months. Such a prolonged illness entails heavy expenses for nursing, "extra nourishment, medical attendance, and the like, as many families "know only too well.

"We have none of us the slightest doubt that the above epidemic "arose from our polluted water supply, and from it alone.

"Many diseases are spread by impure water, such as cholera, "diarrhœa, dysentery, calculus, intestinal worms, and a variety of "other less defined conditions of ill health.

"With regard to cholera, we would point out that our present "water supply is as liable to be contaminated by this disease as it "was by typhoid fever.

"We therefore feel it to be our duty earnestly to impress upon our "fellow townsmen the importance of embracing the present opportunity "of improving our water supply.

(Signed) FREDK. A. BARRINGTON,
G. R. CHADWICK,
CHARLES JACKSON,
CHARLES B. PLOWRIGHT,
R. RHODES REED,
WILLIAM WEBSTER,
W. B. WEDGWOOD,
S. M. W. WILSON,
Medical Men practising in King's Lynn.
"4th September, 1893."

Nevertheless, incredible as it may appear, a large and influential section of the inhabitants of Lynn maintain, or at any rate have maintained until now, that this water, manifestly polluted though it be, is of excellent quality. One individual went so far as to exhibit in his window during the height of the epidemic a vessel of water drawn from the town mains, with a placard attached stating that no better water can be obtained.

Having regard to the countless opportunities of pollution from various sources to which the Lynn water supply has been exposed, I have considered it futile to attempt detection of the particular point, or points, of entry to the Gaywood River, and consequently to the public water service, of the specific infection material, dissemination of which along with the Lynn water has caused the disastrous epidemic that has been witnessed. But difficult though it may be to define "where" specific defilement of this water service occurred, there can be no doubt whatever as to "when" infectious material of enteric fever, suddenly and in large amount, gained access to the supply. In this matter also history in Lynn "repeats itself." As on the occasion of the fever prevalence in Lynn, in 1892, reported on by Dr. Bruce Low, so now in 1897, epidemic enteric fever was preceded, at an interval corresponding to the incubation period of the disease, by exceptional meteorological conditions causing sudden flood in the Gaywood River. In 1897, there were two occasions when similar sudden flooding and consequent befoulment of the river took place. On August the 9th and again on September the 29th, there occurred in Lynn and its neighbourhood very heavy rainfall, so heavy that, as has already been pointed out, flooding of certain parts of the town resulted through the sewers proving unable to carry off the surplus storm water. On each of these occasions large quantities of foul matters must needs, in the circumstances of the Gaywood River, have been swept into the stream, and in due course have found their way into the Lynn waterworks. Twice, therefore, antecedent to the epidemic, and within the space of a few weeks, these waterworks were delivering to the inhabitants of Lynn and Gaywood water suddenly and dangerously befouled. Taking a couple of weeks as the average incubation period of enteric fever, and allowing an extra week to cover diagnosis and notification of attack, an interval of three weeks is the period to be thought of as elapsing between either of these two floods, and recognition of a deleterious influence in the causation of enteric fever to be referred to it. Judged by this standard, the downpour of the 9th of August may well have had to do with inception of the recent epidemic in Lynn and Gaywood; for just about three weeks after this rainstorm, *i.e.*, in September, an increase in current fever was recorded (*see* table, page 66.) The total amount of fever in September, and early October, however, was not large; the cases, though widely scattered over the town in a fashion consistent with water causation of the disease, being too few in absolute amount at that time to definitely convict the water service of having brought it about.

Not so, however, as regards the exceptional rainfall of the 29th of September. This was followed at an interval of three weeks, by an outburst of the fever on a very large scale indeed. On the 20th and 21st of October the notified cases of enteric fever in Lynn and Gaywood suddenly mounted to 12. Next day they were 26, and in the four succeeding days to the 26th of October, no less than 75 additional attacks were notified. And the fever cases of this outburst, be it noted, were distributed from end to end of Lynn and Gaywood, in circumstances which, as I have already stated, left no escape from a conclusion that the outburst had been caused by the water supply. There can be no doubt at all, then, that the epidemic, as such, was due to infection of enteric fever gaining access to the waterworks as a result of the rainstorm of the 29th of September. Why wholesale befoulment of the Lynn public water service effected on one occasion comparatively little mischief, and on the next proved altogether disastrous in the above fashion, is a question which cannot at the present stage of our knowledge be definitely answered. Possibly the storm of 29th September, in that it was as a heavy downpour more widespread than that of the 9th of August, may have (by the floods which it caused) tapped, so to speak, sources of dangerous pollution of the Gaywood River which were not reached, and therefore not flushed out into the stream by the even heavier but more localised August rainfall. This, however, is mere surmise. Moreover, we are by way of learning that outside the animal body the microbe of enteric fever is subject to conditions which, within a short space of time, may check altogether its multiplication and annul its virulence, or may greatly enhance its activities in one or both these directions.

Sanitary Administration in regard to the Outbreak.

On my arrival in King's Lynn, on October 29th, 1897, I found that a notice, in the form of a printed handbill, signed by Mr. Wilson, the Medical Officer of Health, had already been circulated, urging the inhabitants to boil the town water before using it for drinking purposes. I shortly afterwards conferred with the Sanitary Committee of the Lynn Town Council on the subject of the epidemic.

As regarded water supply, while urging upon them to protect in every possible way the Gaywood River from any further pollution, I recommended that a daily supply of water should be obtained from the mains of some neighbouring district in which the water supply is known to be free from contamination, and distributed by means of water carts throughout the town. Failing this, I suggested that some plan should be devised whereby boiled water should be supplied by the Town Council, at any rate to the inhabitants of the poorer quarters of the town.

As regards infected premises, I recommended that instructions should be given as to the disinfection of excreta, and that the necessary disinfectants should be supplied; care to be taken that the disinfection was regularly and efficiently carried out. Also I urged exercise of definite precaution by the Council in the cleansing of infected privies and closets, pointing out at the same time the powers of the Town Council under Section 13 of the Infectious Disease (Prevention) Act of 1890, to prevent the throwing of any infectious rubbish into any receptacle for refuse without previous disinfection. Finally, I recommended careful inspection of all dairies, milk-shops, stores, or places whence milk is supplied, or in which it is kept for sale, pointing out that powers are given to the Medical Officer of Health and the Town Council by Section 4 of the Infectious Disease (Prevention) Act, 1890, to deal with any source of infection of milk, whether within or without their district. These recommendations were afterwards the subject of various printed handbills, in which the observance of various precautions was urged upon the attention of the inhabitants. "Disinfectants" were freely distributed, and two temporary assistant sanitary inspectors were engaged by the Town Council to explain the proper method of employing these disinfectants, and, as far as possible, to see that this was carried out. The sewers were flushed daily, large quantities of carbolic acid being employed. Special measures were taken to secure the cleansing of the narrower streets as well as the courts and alleys, which were visited almost daily for this purpose. During the later period of the epidemic, it was noticeable that the town was clean and free from refuse.

The Borough Isolation Hospital has accommodation for twelve patients only, and little use was made of it in the early part of the outbreak. The West Norfolk and Lynn Hospital received but few cases, and a limited number were accommodated at the workhouse.

A large number of nurses, however, were engaged by the Town Council in view of the circumstance that the greater number of patients were treated at their own houses.

Subsequently to my conference with the Sanitary Committee, water for drinking purposes was brought into the town daily in water carts belonging to the Corporation, from the mains of the Wisbech water supply at Marham. For a while very great difficulty was found in inducing the poorer classes to avail themselves of the safer water thus brought to their doors, but subsequently they made use of it more freely.

In the above ways the best was perhaps done in the circumstances to mitigate disaster that should never have occurred. For it cannot be too strongly insisted on that, so long as the supply of drinking water from the Borough is derived from the Gaywood River, so long will the Borough be at the mercy of waterborne disease. Ever since 1876, the more thoughtful section of the inhabitants have been engaged in a struggle, the bitterness of which only those resident on the spot can realize, to obtain for themselves and their families a wholesome supply of drinking water. In 1875, Mr. Hawksley, being consulted by the

Town Council, recommended that the water should be brought in pipes from one of the springs, direct to the town. Since then, until recently, in vain have Medical Officers of Health, and Engineers, and Surveyors protested, and experts like Mr. Whitaker, F.R.S., and Mr. Mansergh, C.E., reported and advised. The party with whom no argument but the one as to the cost had any weight were too strong.

It might certainly be thought that after the severe outbreak in 1892, which was traced in the clearest manner by Dr. Bruce Low to the infection of the public water supply, all opposition to a new source of supply would cease. But such was not the case. In the end, however, a Provisional Order of the Local Government Board enabled the Town Council to carry out a scheme which might otherwise have been frustrated by the opposing section of the inhabitants. The works in connection with the new scheme for bringing water from deep wells in the Chalk, near Grimstone, are being actively pushed forward, but I am informed that it will be six or eight months before they are completed.

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On Epidemic Measles in Lancaster; by Dr. Thomson.

REPORT on EPIDEMIC MEASLES in the BOROUGH OF LANCASTER; by DR. THEODORE THOMSON.

In the month of May last, on receipt of the Registrar General's Quarterly Return, the attention of the Board was attracted by the fact that there had occurred an exceptionally heavy mortality from measles in the Borough of Lancaster during the first quarter of 1897. Correspondence hereon arose between the Board and the Town Council on the subject of this measles epidemic; and, in view of the fact that the disease still persisted in the district, I was instructed, on July 13th, to make inquiry into the circumstances in which measles had been so fatally prevalent in Lancaster. This I did in the course of the ensuing week, ascertaining the facts now set forth in this report.

The Borough of Lancaster had, at the census of 1891, a population of 31,038 persons, occupying 5,483 houses; at the middle of the present year its population is estimated by the Medical Officer of Health to have risen to 38,228. It covers an area of 1,577 acres, and has a rateable value of £139,368. The town may be regarded as consisting of an older portion, which lies around and at the base of the eminence on which Lancaster Castle stands, and of a newer portion spreading from the older on all sides, but extending more especially in a southerly direction. The older portion of the town shows not a few instances of houses huddled together in a fashion depriving them of proper light and air-space; while the back streets and yards are often indifferently paved, and less clean than is desirable. In the newer parts of Lancaster, on the other hand, the above conditions—air-space, light, paving, and cleanliness—are distinctly superior to those in the older parts of the town. Working-class houses in newer Lancaster have usually two rooms and a scullery on the ground floor, and two or three bed-rooms on the upper floor; in older Lancaster accommodation in houses of this class is scantier. The prevailing system of excrement-disposal is by water-carriage, the town being sewered throughout. House refuse is stored in brick ashpits, and is removed periodically by the Town Council as Sanitary Authority. The town has a public water supply, derived, it is said, from the Millstone Grit of Wyre Fell, some nine miles from Lancaster.

The more recent history of Lancaster as regards measles may be gathered from the following figures, which show the number of deaths referred to that disease and the number of cases that came to the knowledge of the Sanitary Authority year by year during the eight years, 1889 to 1896:—

Year.	Number of deaths referred to measles.	Number of cases of measles known to the Sanitary Authority.
1889	75	1,315
1890	4	91
1891	3	111
1892	18	752
1893	16	609
1894	—	46
1895	20	1,405
1896	2	58
1889–96	138	4,387

If 33,000 be accepted as representing the mean population of Lancaster during the eight years, 1889-96, it appears that the death rate annually from measles per 1,000 persons living during this period was 0.52. This is in excess of the average annual death rate from the same cause in England as a whole during the five years, 1891-95, which was 0.41 per 1,000 persons living. The annual death rate from measles during the same five years in the 33 large towns was 0.60 per 1,000 persons living; while in the 67 other large towns it was 0.44 per 1,000 persons living during the three years, 1894-96.*

From the figures in the table it appears also that the yearly rate of attack by measles in Lancaster during the eight years, 1889-96, was nearly 17 per 1,000 persons living.

The epidemic of measles with which this Report has concern may be regarded as having commenced in December, 1896. During the month of November of that year no case is known to have occurred in Lancaster, and during the previous ten months there had been not more than 38 known cases of measles, scattered irregularly over that period. On December 5th, a child was notified to the Authority as attacked by measles, and this was followed by the notification of four further cases within a fortnight. Several more cases were notified to the Authority towards the end of December, after which the disease increased with rapidity.

The following figures show the cases of measles that came to the knowledge of the Sanitary Authority from December 5th, 1896, to July 15th, 1897. During December, 1896, they are set out according to the dates on which they were made known to the Authority; after that month they are arranged in weekly periods:—

On December 5, 1896	1
" " 16 "	1
" " 17 "	1
" " 18 "	2
" " 24 "	1
" " 28 "	2
" " 29 "	3
" " 30 "	4
" " 31 "	5
During the week ending January 7, 1897	14
" " " 14 "	72
" " " 21 "	70
" " " 28 "	107
" " February 4	112
" " " 11 "	138
" " " 18 "	116
" " " 25 "	123
" " March 4 "	61
" " " 11 "	54
" " " 18 "	40
" " " 25 "	33
" " April 1 "	23
" " " 8 "	15
" " " 15 "	7
" " " 22 "	16
" " " 29 "	32
" " May 6 "	19
" " " 13 "	20
" " " 20 "	22
" " " 27 "	7
" " June 3 "	5
" " " 10 "	19
" " " 17 "	3
" " " 24 "	15
" " July 1 "	8
" " " 8 "	6
" " " 15 "	8
Total, December 5th, 1896—July 15th, 1897 ...	1,185

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* No statistics are available as to these 67 towns prior to 1891.

It appears from these figures that after occurrence of a score of cases in December, of which the last four days of the month show more than half, there ensued rapid increase of the disease, which attained its greatest height in the month of February. Early in March the epidemic began to wane: the number of known cases decreasing at first rapidly, afterwards more slowly, so that, when I visited Lancaster in July, measles had for some time ceased to be regarded as epidemic, although the district was not even then free from the disease.

The total number of deaths in Lancaster referred to measles between December 5th, 1896, and July 15th, 1897, was 51.

ACTION OF THE TOWN COUNCIL.

1. *Measures adopted with a view to obtaining information as regards occurrence of Measles in their district.*

(*a.*) *Compulsory Notification.*—In 1888 measles became compulsorily notifiable in Lancaster by virtue of a provision of the Lancaster Corporation Act, 1880, in which it is enacted that due notice shall be given to the Corporation of persons within the borough suffering from any infectious disease: while "infectious disease" is defined as meaning certain diseases specified in the Act, and also "such other diseases as the Corporation . . . . . . may from time to time declare to be infectious or contagious." In 1888, the Corporation passed a resolution that measles be declared an infectious disease for a period of three years: and an order made by the Corporation to this effect received the Board's approval, as required by the terms of the Act. In March, 1892, this order was, with the Board's consent, renewed for a further period of three years: but was not renewed in 1895 or subsequently. Consequently measles has not been compulsorily notifiable in Lancaster since March, 1895. Nevertheless the disease has continued to be notified in Lancaster. Notification, under the local Act referred to, is dual. Medical practitioners notifying cases of infectious disease in accordance with the provisions of the Act receive two shillings and sixpence for every certificate: with, however, this reservation, that "only one fee shall become payable within an interval of thirty days to the same medical practitioner for certificates given by him in respect of the same disease occurring in the same building."

With a view to securing notification by the householder in those instances where no medical practitioner was in attendance, the Sanitary Authority caused handbills, setting forth the duties and liabilities of the householder in this regard, to be distributed from house to house throughout the borough in January, 1897. This distribution was effected through the agency of the local police. It is the opinion of the Medical Officer of Health and of the Inspector of Nuisances that few cases occurring in the borough failed to be notified, whether by the medical attendant or by the householder. Certain data in support of this opinion will, along with my comments thereon, be found in an Addendum to this report.

(*b.*) *Information from the School Authorities.*—For some four or five years past an arrangement has obtained between the School Attendance Officer and the Inspector of Nuisances, whereby the former reports to the latter official the names and addresses of all children

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absent from school by reason of illness regarded by the School Attendance Officer as likely to be infectious sickness, as for instance measles.

(*c.*) *Information from other sources.*—During the past three or four years it has been the custom for the Officer of the Society for the Prevention of Cruelty to Children, in Lancaster, to inform the Inspector of Nuisances of the existence of cases of sickness regarded by him as probably of an infectious nature.

The information obtained in one or other of the three foregoing ways has, the Inspector of Nuisances informs me, been supplemented, in regard of each invaded dwelling, and as a result of personal inquiry by himself, by facts as to source of infection; and now and again he has made house to house visitation in the invaded neighbourhood with a view to detection of other attacks which had gone unrecorded.

2. *Measures adopted with a view to preventing spread of Measles within invaded dwellings.*

Throughout the whole of the recent outbreak, dwellings ascertained by the Sanitary Authority to have become invaded by measles, were visited by the Inspector of Nuisances. This officer gave verbal instructions that isolation of the sick person should be practised as far as the circumstances of the household would permit, and advocated the use of disinfectants for various purposes in the sick room: also he informed the householder that certain disinfectants could be obtained at the Health Office, free of charge. Before departure, he left with the householder a printed card embodying the instructions which he had given verbally. Second visits to invaded houses were rarely made unless the disease was known to be extending within the dwelling. No disinfection of dwellings which had been invaded by measles was practised.

The Borough of Lancaster is provided with a hospital for infectious diseases. It is a stone building, erected in 1891, and consists of two pavilions of two wards each, of a convalescent ward, of an administrative block, and of outbuildings. At the rate of 2,000 cubic feet of air-space per bed, it would afford accommodation for 18 patients. During the recent measles prevalence no persons suffering from that disease were sent to hospital.

The Sanitary Authority possess a high pressure steam disinfecting apparatus. They did not, however, in any instance cause infected articles in dwellings that have been invaded by measles to be disinfected at the close of the illness.

3. *Measures adopted with a view to checking extension of the disease throughout the borough.*

(*a.*) *Information furnished to School Authorities.*—The Sanitary Authority systematically informed the School attendance Officer and also the teacher of the school concerned, whether a public elementary school or a private school, as to the name and address of every known case of measles occurring in families of which members attended school. Similar information, however, was not afforded to teachers of Sunday schools.

(*b.*) *Exclusion from School of members of households invaded by Measles.*—Children suffering from measles, and all members of households known to be invaded by measles, were excluded from school, by the Sanitary Authority and the School Authorities acting in conjunction, until four weeks after the occurrence of a case of this disease in the family.

(*c.*) *School closure.*—With two exceptions, all public elementary schools in the borough were closed, with a view to check extension of measles, from February 4th to April 5th, 1897. These schools were closed in virtue of powers under Article 88 of the Code of Regulations approved by the Lords of the Committee of Council on Education. The Corporation are also empowered, by their Act of 1880, to "order public or private day schools, or places of public resort, situate in neighbourhoods affected by infectious disease, to be temporarily closed or suspended." No private day schools nor Sunday schools were closed at the instance of the Sanitary Authority with a view to checking extension of the measles epidemic.

(*d.*) *Other measures.*—There are two public libraries in Lancaster, and the Sanitary Authority systematically furnished the librarian of each with the names and addresses of all persons known to be suffering from measles, with a view to members of the invaded households not being supplied with books until this might be done with safety. The Sanitary Authority, however, did not further inform the librarians as to when these households might be regarded as free from infection.

ORIGIN AND PROPAGATION OF THE OUTBREAK.

As already stated, not more than 38 cases of measles are known to have occurred in Lancaster during the first 10 months of 1896, and during November of that year no case is ascertained to have occurred. Locally, the recent outbreak is believed to have originated with a child, notified on December 5th, who had recently come from another district where measles was at the time epidemic. I myself was unable to trace any connection, save in one instance, between this child and the other cases which occurred later in December. Indeed, inquiry concerning possible infection from case to case as regards these earlier attacks gave, in almost all instances, a negative result, and I was unable to discover anything that could justify belief that the source of the outbreak was the imported case of December 5th. Rather with my investigations came suggestion that the disease had not really been extinct in November and early December in Lancaster, and that to scattered cases about that time, whether known to the Sanitary Authority or not, the attacks between December 16th and 28th, which appear to have formed points of origin of the outbreak which followed, were to be referred. In this connection it is perhaps significant that the cases notified in December, up to the 28th of the month, were not restricted to one particular part of the town, but were scattered somewhat widely. After December the progress of the epidemic was rapid, and soon the whole of the town, save a small part lying to the north of the river which flows through Lancaster, was affected. The town, however, although generally affected, did not suffer equally in all its parts. The incidence of measles was heavier on certain newer portions of the town, largely composed of working-class houses of the better sort, than on older Lancaster, where, along with working class houses, there are many business premises and residences where the juvenile population is likely to have been scantier.

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As to the manner of propagation of the disease, the facts which came under my observation tend to suggestion that in January and earlier February the rapid extension of the epidemic was aided by schools. Fuller account, however, of the measles in this aspect, along with discussion of the question as to what influence may have been exerted on the course of the epidemic by the closure, already referred to, of certain schools, will be found in an Addendum to this Report.

Other opportunity, however, in addition to that afforded by schools, for the extension of the disease, is to be found in the numerous possibilities of personal communication between sick and healthy. And here there is room for criticism of the Sanitary Authority's administration. Though there was less house-to-house inquiry in invaded neighbourhoods than was perhaps needful, yet their methods of obtaining information as to occurrence of measles in their district would seem to have been, in the main, well considered. The issue of a notice to every householder, in the early stages of the epidemic, calling his attention to his duty as regards informing the Authority of existence of measles in his family, is to be commended, and is to be thought of as having been attended with good results (*see* Addendum A). But the arrangements for obtaining information from the School Authorities were somewhat defective: inasmuch as information from the School Attendance Officer, who visits his schools only once a week for the purpose of ascertaining what children are absent, might clearly be a week, or even more, in arrear as to occurrences of measles among children attending these schools. The Sanitary Authority, I understand, are now making arrangements whereby they will be informed directly by the responsible teachers of schools as to suspected measles, or other infectious sickness, among their scholars. So far, the Town Council's methods with measles were not unsatisfactory. But it is otherwise with the measures taken by them with a view to prevent spread of measles in invaded dwellings.

It is true that their Inspector of Nuisances visited all houses known to be invaded by measles, and gave the instructions already detailed, but subsequent visits, with a view to seeing that the precautions recommended were being observed, were rarely made. Indeed, from what I was able to gather during my visit to Lancaster, the sick and the healthy would seem to have commonly occupied the same room. For this scanty supervision of invaded dwellings blame cannot be held to attach to the health staff, which consists only of a Medical Officer of Health, who is also engaged in private practice, and an Inspector of Nuisances, who is also Inspector of Nuisances to the Port of Lancaster, and Superintendent of Scavenging in the Borough. On these two officers devolve all the duties connected with the care of the health of a population of 38,000 persons. I learned that the mere paying of a single visit to each dwelling invaded by measles entailed on the Inspector of Nuisances, during the height of the epidemic, work which occupied him daily till nine or ten o'clock at night.

Notwithstanding that means of isolation at home would seem to have frequently been wanting, no cases of measles were removed to hospital. It is, perhaps, more than may at present be looked for that an Authority should provide accommodation in hospital sufficient to cope with an epidemic of measles at its height. But in the earlier stages, at least, of measles prevalence, isolation in hospital of persons attacked might well be attempted, in the hope of thus averting an epidemic.

In the matter also of final disinfection of invaded dwellings and of infected articles therein, the Lancaster Corporation failed in their duty. They possessed the necessary means of efficient disinfection, but they made no use of them. For this failure, probably, the inadequacy of the health staff provided by the Corporation is in large degree responsible.

In regard of such measures as affording information to School Authorities, excluding from school members of households invaded by measles, closure of schools, and taking precautions against dissemination of measles by books sent from public libraries, the efforts of the Corporation, although not free from ground for criticism, were more satisfactory. They omitted, indeed, to afford to teachers of Sunday Schools information of the sort given to teachers of public elementary and private schools. Again, when it appeared to them that certain public elementary schools should be closed, they do not seem to have made any effort to procure closure of corresponding Sunday schools, although the fact that the latter were remaining open was to be thought of as tending to neutralise any benefit that might be looked for from the closing of the former.

While, therefore, the Corporation of Lancaster made endeavour to deal with the recent epidemic of measles in their district, yet in several respects they fell short of their duty in this regard. Many of these shortcomings would probably have been avoided had the Corporation had a health staff sufficient to discharge the duties involved in attempt to control an epidemic of measles. But the present staff cannot be regarded as adequate to the duties that ordinarily devolve upon it; much less is it adequate when these duties are largely added to by an epidemic of measles.

The Corporation of Lancaster should, therefore, provide for the borough a health staff sufficient for the ordinary needs of the district: to be temporarily increased, if necessary, in epidemic times in such degree as would tend to discovery of unrecorded cases and render practicable the adoption and maintenance of proper precautions against the spread of the current infection within invaded dwellings, and throughout their district. They should also take into consideration the advisability of extending their hospital accommodation to such degree as would enable them to remove thither for isolation, cases of measles in inter-epidemic periods at least. Having regard, moreover, to the value of prompt notification of measles, under a proper system of local administration, especially in inter-epidemic periods, the Corporation will do well to consider whether they should not take steps to again extend their Act of 1880 to measles, either permanently or for a considerable term of years.

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ADDENDUM A.

NOTIFICATION OF MEASLES IN THE BOROUGH OF LANCASTER.

As stated in the body of this Report measles became compulsorily notifiable in the Borough of Lancaster in 1888: and, although this procedure ceased to be compulsory early in 1895, yet measles has continued to be notified to the Corporation as before. As already noted, the number of cases of the disease which came to the knowledge of the Authority in the recent epidemic, between December 5th 1896 and July 15th 1897, amounted to 1,185. The sources of this knowledge are shown in the following figures:—

Cases reported by medical attendants only	672
Do. do. parents only	461
Do. do. both parents and doctors	49
Do. discovered otherwise	3
Total ...	1,185

These figures are of interest by reason of the considerable number of instances in which notification was received from the householder: these amounting to 510 out of 1,185, or 43 per cent. of the total.

It has been matter of frequent comment on "dual" notification that the duality is apt to be something of a fiction: the householder failing usually to discharge the duty incumbent upon him to inform the Sanitary Authority of the existence of infectious disease in his dwelling. This failure on the part of the householder has not usually been regarded as of material consequence in respect of diseases for which medical attendance is wont to be deemed a necessity; inasmuch as the Authority receive the requisite information from the medical attendant. But, in regard of measles, which is thought by many persons not to call for medical treatment, notification by the householder becomes, by reason of this condition, of considerable importance. And this failure by the householder to notify existence of infectious disease in his dwelling has frequently led, in respect of measles, to ignorance, on the part of Sanitary Authorities, of so many cases of the disease in districts invaded by it, as to give rise to question of the value of compulsory notification as a source of information of its existence. In Lancaster, however, as indicated by the foregoing figures, notification by the householder was, in the recent epidemic, of considerable amount: and, as already stated in the body of this Report, the local health staff believe that, during that epidemic, but few cases of measles failed to be notified to the Authority, whether by the medical attendant or by the householder. It is possible that the considerable proportion of cases notified by the householder is referable to the distribution from house to house throughout the borough by members of the local police force, early in January of the present year (1897), and in the early stages of the epidemic, of the following notice:—

BOROUGH OF LANCASTER.

INFECTIOUS DISEASES.

NOTICE IS HEREBY GIVEN

that in accordance with the Lancaster Corporation Act, 1880:

1. Any person having the management or control of any building in which a

CASE OF INFECTIOUS DISEASE

occurs, or the person in charge of such case shall, so soon as he shall become aware of the existence of such disease,

FORTHWITH GIVE NOTICE THEREOF

to the Inspector of Nuisances at his office in the Market Hall.

2. The following are Infectious Diseases within the meaning of the above Act:

Small pox	Relapsing Fever
Cholera	Puerperal Fever
Diphtheria	Scarlet Fever
Typhus Fever	Measles
Enteric or Typhoid Fever	Rotheln

3. Any person offending against the above Enactment shall for every such offence be liable to a

PENALTY not exceeding FIVE POUNDS.

W. O. ROPER, Town Clerk.

The Inspector's Office is open daily from 9.30 to 10.0 and 5.0 to 5.30; Saturdays, 12.0 to 12.30.

January, 1897, however, was not the first occasion on which a similar notice regarding notification of measles had been, in like manner, distributed throughout the district. This procedure had been adopted in other years; as will be seen from the subjoined table, in which are set out revised data furnished to me regarding the total number of known cases of measles year by year in Lancaster, subsequent to 1888, when the disease became compulsorily notifiable, with the numbers in each instance notified by householders and by medical attendants.

Cases of Measles.	* 1889	1890	1891	† 1892	1893	1894	** 1895	1896
Reported by Householders ..	407	14	21	222	246	9	663	18
Reported by Medical Attendants	894	75	78	499	326	37	705	40
Reported by both Householders and Medical Attendants.	14	1	1	25	23	—	36	—
Discovered otherwise	—	1	11	6	14	—	1	—
Totals	1,315	91	111	752	609	46	1,405	58

* Notice as to householder's duty to notify issued in January or February.
† Notice as to householder's duty to notify issued in December.
** Notice as to householder's duty to notify issued in January.

From these figures it appears that the proportions of known cases notified by the householder during the years 1889-96 were as follows:—

1889	... 32	per cent.	(Epidemic, January—May).
1890	... 16	do.	
1891	... 20	do.	
1892	... 33	do.	(Epidemic, January—April and November—December).
1893	... 44	do.	(Epidemic, January—June).
1894	... 20	do.	
1895	... 50	do.	(Epidemic, January—August).
1896	... 31	do.	

In the 1897 epidemic, as already noted, the proportion notified by householders was 43 per cent. of the known cases.

The proportion of notification by the householder in the epidemics of 1893, 1895, and 1897, was, it will be seen, markedly greater than in that of 1889; a fact, perhaps, referable to the greater familiarity of householders with their obligations in consequence of the repetition of notices. It would seem also that the proportion of notification by the householder tends to be less in inter-epidemic periods than in epidemic periods. If this should be due to greater neglect by the householder of his duty in regard of measles notification in times when measles is not epidemic, it may be a question worthy of consideration whether advantage might not arise from periodically stimulating the householder as to the need for notifying measles, in place of issuing notices only at the commencement of an epidemic. For it is in inter-epidemic periods that full information as to the existence of measles in the district is of special value; since complete knowledge of the sort, combined with appropriate preventive measures, may hinder the disease from becoming epidemic.

In considering, however, the value of notification by the householder in Lancaster, as indicated by the foregoing figures, it has to be borne in mind that this value will differ according to the circumstances under which notification has taken place. It will be remembered that in Lancaster there is in force, as set out on page 82 of this volume, a provision whereby "only one fee shall become payable within an interval of thirty days to the same medical practitioner for certificates given by him in respect of the same disease occurring in the same building." When, therefore, a dwelling has been notified by the practitioner as invaded by measles, no further cases of measles occurring in that dwelling need be notified by him to the Sanitary Authority within the month following his notification of the first case, and hence but few cases other than "first cases" can be thought of as being notified by the practitioner.

These further cases may, however, be notified by the householder: and it is possible that the considerable proportion of notification of measles by the householder in Lancaster may have come about in this way. But it is in instances where no medical attendant has been called in that notification by the householder is of greatest value: since, but for this, foci of the disease may readily escape detection. In those instances, on the other hand, where a case of measles has been notified by the medical attendant, the dwelling may be kept under observation by the Sanitary Authority's officers: and thus, even in the absence of further notification by either medical attendant or householder, knowledge may be had of other cases occurring there. It does not appear what proportion of the notifications of measles by the householder in Lancaster were of that class from which, as indicated, most benefit is to be anticipated.

ADDENDUM B.

As to what Amount of Control of Measles, if any, was afforded by the Closing of certain Schools in Lancaster during the Epidemic prevalence of this Disease there in 1897.

There are, within the Borough of Lancaster, 13 public elementary day-schools, affording accommodation for 6,646 children. There are also, it is computed, some 30 private schools, with a total attendance of 500 to 600 children: of which number nearly half are children attending the Grammar school and the Friends' school, the other private schools being of small size Details as to the number of Sunday schools in Lancaster, and of the attendance thereat, were not forthcoming.

All public elementary day-schools closed for the Christmas holidays on December 22nd or 23rd, 1896, and re-opened on January 11th, 1897. Private schools also closed for these holidays; but for what number of days in each instance I cannot state. Sunday schools did not close during the Christmas period.

All public elementary day-schools in the Borough, save two, were closed, at the instance of the Sanitary Authority, from February 4th to April 5th, 1897. Three or four of the smaller private schools are stated to have voluntarily closed for a short period about this time. No Sunday schools were closed.

With a view to appreciating what, if any, effect on the course of the epidemic may have been produced by these closures of schools, a record of known cases of measles, at first in daily and afterwards in weekly periods, is here appended; together with the times during which schools were closed.

	Cases of Measles.	
On December 5, 1896	1	
„ „ 16 „	1	
„ „ 17 „	1	
„ „ 18 „	2	
„ „ 24 „	1	All public elementary schools closed from December 22 or 23 until January 11th for Xmas holidays. Private schools closed for uncertain period. Sunday schools not closed.
„ „ 28 „	2	
„ „ 29 „	3	
„ „ 30 „	4	
„ „ 31 „	5	
During the week ending January 7, 1897 ...	14	
„ „ „ 14 „ ...	72	
„ „ „ 21 „ ...	70	
„ „ „ 28 „ ...	107	
„ „ February 4 „ ...	112	
„ „ „ 11 „ ...	138	All public elementary schools closed save two from February 4 to April 5. Two or three small private schools closed about this time. No Sunday schools closed.
„ „ „ 18 „ ...	116	
„ „ „ 25 „ ...	123	
„ „ March 4 „ ...	61	
„ „ „ 11 „ ...	54	
„ „ „ 18 „ ...	40	
„ „ „ 25 „ ...	33	
„ „ April 1 „ ...	23	
„ „ „ 8 „ ...	15	
„ „ „ 15 „ ...	7	
„ „ „ 22 „ ...	16	
„ „ „ 29 „ ...	32	
„ „ May 6 „ ...	19	
„ „ „ 13 „ ...	20	
„ „ „ 20 „ ...	22	
„ „ „ 27 „ ...	7	
„ „ June 3 „ ...	5	
„ „ „ 10 „ ...	19	
„ „ „ 17 „ ...	3	
„ „ „ 24 „ ...	15	
„ „ July 1 „ ...	8	
„ „ „ 8 „ ...	6	
„ „ „ 15 „ ...	8	
Total, December 5th, 1896 to July 15th, 1897	**1,185**	

In regard of inference from these figures as to influence of schools on measles prevalence at the Christmas period, it is to be noted that the first marked increase of measles took place during the last four days of December and the first week of January: a fact compatible with the public elementary schools, which did not close until December 22nd or 23rd, having operated in dissemination of the disease.

But the great increase of cases in the fortnight immediately following cannot be attributed to spread of the disease by public elementary schools, since these had remained closed until January 11th. It must be borne in mind, however, that any good results that might be looked for from public elementary schools remaining closed during this period would be apt to be neutralised: firstly, by the Sunday schools remaining open, and, secondly, by the numerous re-unions of children that are wont to take place at the Christmas season.

The disease, as shown in the figures given above, continued to increase rapidly during January, and, accordingly, on February 4th, all public elementary schools in the borough, save two, were closed at the instance of the Sanitary Authority, and they remained closed until April 5th. The two public elementary schools that were not closed are situated in a small part of Lancaster lying to the north of the river that flows through the town, a neighbourhood which was, at this time, almost free from measles. As already stated, two or three small private schools closed about this time: but no Sunday schools were closed. Three weeks after closure of the public elementary schools a marked decrease ensued in the amount of measles in the district, a decrease which continued until the week ending April 22nd, when, as well as in the four following weeks, there was again some increase. It is noteworthy that this recrudescence of the disease occurred some two weeks after the re-opening of the public elementary schools. It was not, however, a long sustained increase: and measles diminished again during June and July, possibly owing to the adverse seasonal influence believed to be exerted on the disease about this time of year. By mid-July it had ceased to be regarded as epidemic.

The marked decrease noted as having occurred within three weeks of the closure of schools on February 4th, tends to suggestion that this measure had a repressive influence on the course of the epidemic: while its recrudescence within a fortnight of their re-opening, though comparatively slight, is consistent with facilities having been afforded by schools for further propagation of measles.

I append here certain figures, based on data furnished to me by Mr. F. W. Smith, the Inspector of Nuisances of the Borough of Lancaster, which indicate, to some extent, the influence of schools in serving to spread measles among the community. The 1,185 cases of measles, that are known to have occurred between December 5th and July 15th, are divided into four categories, viz.:

Class A.—Children attending a public elementary school.
Class B.—Children attending a private school.
Class C.—Children, not themselves attending school, but belonging to a family of which members attend school.
Class D.—Children not attending school, nor belonging to a family of which any member attends school.

The numbers of attacks in each of these four classes of children are given week by week, from the week ending December 10th, 1896, to the week ending July 15th, 1897, as follows:—

Week ending	CLASS A. Children attending P.E. school.	CLASS B. Children attending private school.	CLASS C. Children having relatives at school.	CLASS D. Children entirely unconnected with school.	Total.
Dec. 10	—	—	—	1	1
„ 17	2	—	—	—	2
„ 24	1	—	—	2	3
„ 31	12	—	2	—	14
Jan. 7	13	—	1	—	14
„ 14	57	2	7	6	72
„ 21	41	1	19	9	70
„ 28	77	—	15	15	107
Dec. 5—Jan. 28 ..	203	3	34	33	283

Week ending	Class A. Children attending P.E. school.	Class B. Children attending private school.	Class C. Children having relatives at school.	Class D. Children entirely unconnected with school.	Total.
Brought forward—	203	3	34	33	283
Feb. 4	91	—	15	6	112
„ 11	65	—	44	29	138
„ 18	53	—	37	26	116
„ 25	56	3	32	32	123
Mar. 4	16	1	30	14	61
„ 11	13	1	23	17	54
„ 18	8	8	17	7	40
„ 25	6	7	15	5	33
April 1	3	1	12	7	23
„ 8	2	3	7	3	15
„ 15	3	—	3	1	7
„ 22	11	2	1	2	16
„ 29	19	1	6	6	32
May 6	8	1	8	2	19
„ 13	7	1	8	4	20
„ 20	6	2	10	4	22
„ 27	4	—	2	1	7
June 3	—	—	2	3	5
„ 10	11	—	5	3	19
„ 17 .. .	2	—	1	—	3
„ 24	7	—	6	2	15
July 1	4	1	3	2	10
„ 8	1	—	3	—	4
„ 15 .. .	6	—	2	—	8
Dec. 5—July 15 ..	605	35	336	202	1,185

In view of the absence of information as to the ages of the 1,185 children thus classified and as to the total number comprised in each class, it would be unwise to draw definite conclusions from these figures as to the influence of schools in dissemination of measles.

It is, nevertheless, worthy of note:

(1) That nearly all the cases in the weeks ending December 31st and January 7th, occurred among children who had been attending public elementary schools, before these schools had closed on December 22nd or 23rd.

(2) That the maximum incidence of attack in its class is first reached in the case of children attending public elementary schools; which may be regarded as referable to the greater facilities afforded by these schools for the dissemination of measles. The maximum incidence in Classes C. and D. occurs about two weeks after that in Class A.

(3) That there was a sudden drop in measles prevalence in the week ending March 4th, and in weeks immediately following. This is referable, mainly, to decrease of attacks among children attending the public elementary schools, which had been closed some three weeks previously.

(4) That there was recrudescence of measles in the week ending April 22nd, some two weeks after the re-opening of public elementary schools, and in weeks immediately following; and that this recrudescence was mainly due to increase of measles among children attending these schools.

(5) That the chief incidence of measles on children attending private schools, of which but few were closed, occurred at a time when the epidemic was otherwise on the wane.

On the whole, these data tend to suggest beneficial influence exerted by school closure on the course of the epidemic. Indeed, the decrease of measles in the district within three weeks of school closure in February is difficult of other explanation. The time of year at which this decrease took place, namely, the month of March, is not one to suggest seasonal influence as a cause of the decrease. Nor is the number of those attacked by measles in the course of the epidemic, constituting but three per cent. of the population of the borough, of a magnitude to suggest exhaustion of susceptible material as accounting for disappearance of the disease in epidemic form from the district.

No. 9.

REPORT on the SOURCES and CIRCUMSTANCES of the PUBLIC WATER SERVICE provided by the BURY CORPORATION for the SUPPLY of the COUNTY BOROUGH of BURY and CERTAIN NEIGHBOURING DISTRICTS; by DR. R. BRUCE LOW.

APP. A. No. 9

On the Source and Circum stances of th Bury Corpora tion Public Water Service by Dr. Bruc Low.

The public water service of the town of Bury is the property of the Corporation. This body possess also Parliamentary powers to supply wholly or in part other eight, adjoining, districts. These are the two boroughs of Haslingden and Rawtenstall, the five urban districts of Ramsbottom, Little Lever, Prestwich, Radcliffe, and Whitefield, and the Rural District of Bury. At present six of these eight districts are partly served by local water supplies in addition to the Bury public service.

For a series of years repeated complaints, some of them by the Health Authorities concerned, others by private parties, have been addressed to the Board as to the quality of the water supplied by the Bury Corporation. During the same period the annual reports of the Medical Officers of Health for most of these districts have again and again called attention to defects of this public water supply.

Meanwhile the Board have possessed none but indefinite information regarding the sources and circumstances of this particular water service. For many years the Medical Officer of Health for the County Borough of Bury has not been under the Board's Order, and consequently no annual or special reports have been received from him at Whitehall. Recently, it is true, a new Medical Officer of Health having been appointed for Bury, an annual report by him for 1896 was duly received; but such report, though dealing in a comprehensive manner with the chief sanitary conditions of Bury, contained no reference whatever to the subject of its water supply.

During the current year the fact that the Bury Corporation were about to promote a Bill in the forthcoming session of Parliament to extend their powers in regard to water supply, to enable them among other matters to acquire by compulsory purchase lands and tenements situated on their gathering grounds, to construct additional works, and to increase the water rents and charges, was brought prominently before the Board in connexion with renewed complaints, especially from Haslingden, Rawtenstall, and Ramsbottom, regarding the quality of the water supplied to them by the Bury Corporation; and public inquiry by the Board was asked for. Accordingly it was deemed advisable to have the several sources of this water service inspected and reported upon by one of the Board's Medical Staff. The inquiry was allotted to me on October 29th and I commenced the investigation on November 1st, continuing it on subsequent days. I now report as follows:—

Brief General Description of the Bury Water Supply.

The Bury Corporation's water supply is obtained from six gathering grounds. Five of these are situated at distances varying from 2 to 10 miles from the Borough; the sixth lies on the outskirts though almost altogether within the Borough boundary. The supply is upland surface water supplemented by springs. It is constant and is delivered to consumers without filtration. Owing to the configuration of the locality portions of the same district receive sometimes water from two or more different reservoirs. It is possible

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also to substitute within a given district the water from one reservoir for that from another. The annexed Map I. shows the situation of the gathering grounds and their reservoirs and also the course of the water mains from the reservoirs to the various districts, along with the connexions of the mains which permit of the intermingling of water from the different reservoirs. This map has been prepared by Mr. J. Cartwright, M. Inst. C.E., the Borough Engineer.

In Table I. will be found the chief facts relating to the six gathering grounds; their areas, and the sanitary districts in which they are situated. The areas of the collecting reservoirs are also given, along with their capacities, their level above Ordnance Datum, and the dates when they were constructed. It is necessary to state, to avoid misunderstanding, that in two instances the gathering grounds are locally known under two different names, Hapton being occasionally called "Clow Bridge," and Harden Clough being sometimes spoken of as "Shuttleworth."

TABLE I., giving the names of the Bury Corporation's six Gathering Grounds, their Areas, and the Sanitary Districts in which they are situated; together with the Areas and Capacities of the Respective Reservoirs, their Levels above Ordnance Datum, and the Dates of their Construction.

Name of Gathering Ground.	Area in Acres.	Name of the Sanitary District or Districts in which the Gathering Grounds are situated.	Area of the Reservoirs in Acres.	Capacity of Reservoirs in (*a*) cubic feet (*b*) gallons.	Level of Reservoirs above Ordnance Datum.	Date of Construction of Reservoirs.
					feet.	
1. Calf Hey ...	872	Borough of Haslingden.	23	(*a*) 22,500,000 (*b*) 140,625,000	800	1860
2. Holden Wood	1,313	Borough of Haslingden.	20	(*a*) 14,410,000 (*b*) 90,062,500	670	1845
3. Hapton, or Clow Bridge.	1,303	Borough of Rawtenstall and Rural District of Burnley.	88	(*a*) 56,000,000 (*b*) 350,000,000	925	1861
4. Clough Bottom	736	Borough of Rawtenstall and Rural District of Burnley.	32	(*a*) 28,000,000 (*b*) 175,000,000	1.010	1895
5. Harden Clough or Shuttleworth.	206	Rural District of Bury.	3¾	(*a*) 2,240,000 (*b*) 14,000,000	660	1840
6. Gin Hall ...	202	County Boro' of Bury.	14	(*a*) 7,000,000 (*b*) 43,750,000	475	1850

In addition to the above collecting reservoirs there is a service reservoir at Clarke's Hill, some 4 miles south of Bury. This reservoir is 2 acres in extent and has a total capacity of 1,240,000 cubic feet or 7,750,000 gallons. It is situated 443 feet above Ordnance Datum, and is fed chiefly from the Hapton reservoir; it was constructed in 1879. There is also a small service reservoir, fed from Calf Hey, and

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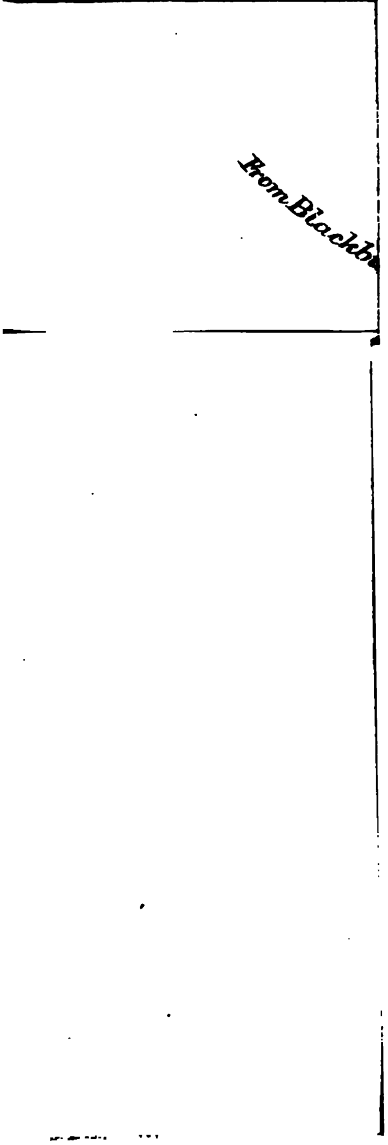

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On the Sources and Circumstances of the Bury Corporation Public Water Service by Dr. Bruce Low.

holding 700,000 gallons, situated a little to the north of the Holden Wood reservoir. Reference to this service reservoir will be found further on (page 98), when discussing the circumstances of the Calf Hey water. Up to three or four years ago a third service reservoir, within the Borough, was in use, but it has been transformed into an ornamental lake and thereupon ceased to have any concern in the Bury public water service.

It is estimated that when the collecting reservoirs are full, they contain over 813,000,000 gallons, a supply sufficient to last at least 170 days, allowing 30 gallons daily for each head of the population now using the water.

Table II. gives the names of the districts supplied with water by the Bury Corporation, the population of these districts, and the reservoirs from which the supply usually comes.

TABLE II. giving the Districts supplied with Water by the Bury Corporation, along with their Populations at the Census of 1891; the Estimated Number of the Inhabitants in 1897 using this Public Water Service; the Estimated Number of Houses in each District receiving the Bury Water; with the Source or Sources of the Water so supplied.

Districts supplied with water by the Bury Corporation.	Population at the Census of 1891.	Estimated population supplied in 1897 with the Bury water.	Estimated number of Houses supplied in 1897 with Bury water.	Collecting Reservoirs from which each District is commonly supplied.
1. County Borough of Bury.	57,212	62,200	12,440	Gin Hall, Hapton, Calf Hey, and Harden Clough.
2. Borough of Haslingden (part of).	18,225	13,245	2,649	Clough Bottom and Calf Hey.
3. Borough of Rawtenstall (part of).	29,507	16,755	3,351	Hapton and Clough Bottom.
4. Urban District of Ramsbottom (part of).	16,726	13,315	2,663	Hapton and Calf Hey.
5. Urban District of Little Lever.	5,168	5,275	1,035	Hapton.
6. Urban District of Prestwich (part of).	10,485	3,760	752	Hapton and Calf Hey.
7. Urban District of Radcliffe.	20,015	30,870	6,174	Gin Hall and Hapton.
8. Urban District of Whitefield (part of).	10,781	4,650	930	Hapton and Calf Hey.
9. Rural District of Bury (part of).	14,056	7,430	1,486	Hapton and Calf Hey.
Totals ...		157,500*	31,500*	

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* These figures and other information contained in this table have been supplied to me through the kindness of Mr. T. Rigby, the Waterworks Manager.

In the above table, it will be seen that no district is given as being supplied from the Holden Wood reservoir. Until recently the majority of persons in the locality regarded this as merely a compensation reservoir for the supply of mill owners lower down the valley, not as

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an adjunct of the Bury Corporation's supply. But last year it transpired, during a public inquiry relating to an application from the Haslingden Town Council for sanction to borrow money to buy land for a cemetery, that Holden Wood water has been upon occasion utilised in the public water service. The fact was, I am informed, established upon the testimony of representatives of the Bury Corporation who opposed the Haslingden Council's application, and they contended that the proposed cemetery would be liable to pollute a section of the public supply.* The Holden Wood water, I am told, is used only upon occasion, and not regularly. In 1896, the Holden Wood water was utilised for the public service on 54 days, and in 1897 on 80 days. But taking the average of past years it is stated that the total number of days on which this supplementary supply is used will range from about 50 to 60, distributed at intervals over the year. Probably the districts usually receiving their supply from Calf Hey are thus liable to receive at times water from the Holden Wood reservoir.

The original waterworks, now the property of the Bury Corporation, belonged to two companies; the Radcliffe and Bury Waterworks Company established in 1838, and the Haslingden and Rawtenstall Waterworks Company established in 1851. From these companies the works were purchased at considerable cost in 1872, in which year the Bury Improvement Act was passed giving the Town Council certain powers in regard to waterworks. In 1885 another Bury Improvement Act was obtained and this also gave certain powers as to Water Supply. In 1889 the Bury Corporation Waterworks Act was passed, giving power to the Corporation to acquire lands, to take easements, and to construct additional works. The Bury Corporation Act of 1894 gave further powers to the Town Council in connexion with the Waterworks Undertaking. The new Bill which the Corporation are now promoting in Parliament deals with a number of other matters of importance such as Tramways, Gas, Public Library and Art Gallery, Infectious Diseases Hospital, Conversion of Privies into Waterclosets, &c. The clauses relating to Water Supply include provisions for the construction of New Waterworks; closing of roads and footpaths; compulsory purchase of lands for waterworks purposes; construction of water pipes through streets, lands, and premises, and compulsory easements therefor; compulsory purchase of lands for protection of water and waterworks from pollution; purchase, redemption, cancellation, and conversion of Irredeemable Water Annuities; and alteration and increase of water rates, rents, and charges.

The Gathering Grounds.

The gathering grounds of the Bury Corporation consist in great part of high-lying moorland, sparsely populated except in some places. Some of these high-lying lands attain an elevation of 1,250 feet above Ordnance Datum. Geologically the district lies partly on the Coal Measures and partly on the Millstone grit. There is alluvium, gravel, and clay, in the lower lying portions of the valleys. Patches of peat are met with in places upon the high ground. As a rule the surface soil in the lower lying ground is not retentive, the rainfall running rapidly down the slopes towards the rills and rivulets that feed the reservoirs. The lower slopes of the valleys are usually

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* The proposal to purchase this land for a cemetery was dropped owing to other obstacles which had not been foreseen.

On the Sources and Circumstances of the Bury Corporation Public Water Service; by Dr. Bruce Low.

laid out in meadows that at certain seasons have to be top-dressed with manure; the upper slopes and high ground consist chiefly of rough pasture and waste land of little agricultural value. The rainfall of the district in which these gathering grounds lie, has averaged during the last 10 years a little over 44 inches per annum.

The collecting reservoirs have been constructed in most instances by throwing a dam across a valley. The people resident upon the gathering grounds are engaged chiefly in agricultural pursuits. The farm houses are scattered as a rule on the hillsides: but in places there is aggregation of houses. On one gathering ground, as will be seen further on, there are practically two villages near a reservoir. Stone-quarrying is carried on as well as brickmaking within the catchment areas, and on one gathering ground a small colliery is worked. Upon another ground are situated two cotton mills employing between them a number of hands, amounting to close upon 250.

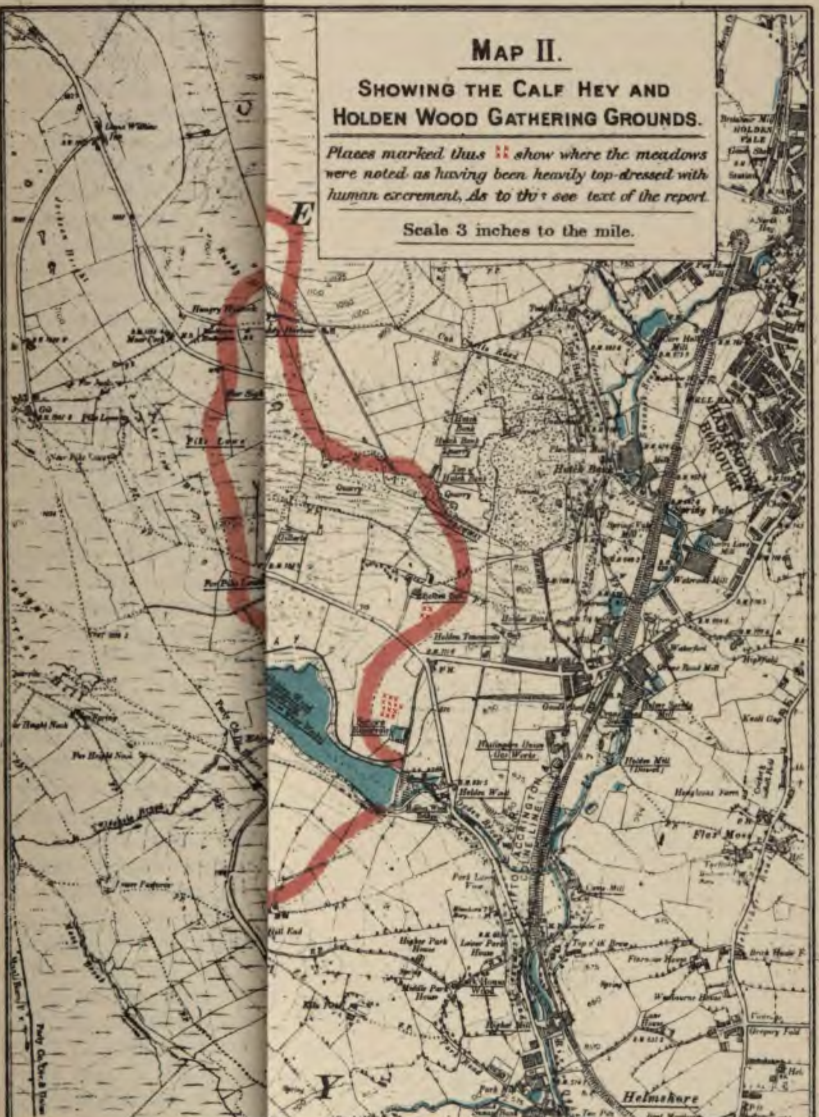
As has already been stated, the water is not filtered before delivery to the consumers. On leaving some of the collecting reservoirs the water passes through a copper wire gauze screen before it enters the mains; the larger solid particles contained in the water are thus prevented from passing into the pipes. But the screening, when practised at all, is insufficient. Occasionally, from exceptional pressure of the outflowing water the screen or strainer is ruptured, with the result that minnows, newts, and the like gain entrance to the mains and create alarm or disgust in the minds of the householders when such unwelcome visitors are delivered from their taps. Occasionally smaller creatures like the water flea can be easily recognized by the naked eye in the water drawn from house taps. The greatest cause of complaint, however, is the occasional brown discoloration of the water, and the presence in it of a more or less thick sediment. Samples of thick and discoloured water recently collected from house taps were shown to me at Haslingden, Rawtenstall, and Ramsbottom. This condition of the water is stated by the waterworks officials to be due to scouring of deposit from the interior of old mains and pipes by sudden increase of the flow through them. It is admitted in this connexion that flushing of water mains has not, from motives of economy, been regularly practised, and that the result has been the accumulation of vegetable and mineral débris in the older pipes, which when laid 30 or 40 years ago were not, as has been done in the case of the more modern pipes, protected in their interior against corrosion or encrustration.

The following is a short description of each of the six gathering grounds:—

(1.) *Calf Hey Gathering Ground.*—Calf Hey and Holden Wood gathering grounds occupy the same valley, the former comprising the upper portion of the valley, and the latter the lower (*see* Map II. appended). This valley runs almost due east and west, and is situated some eight miles N.W. of Bury Town. The hills rise sharply on each side of the valley; but the south slope is steeper and more thinly populated than the north slope. The whole of the Calf Hey and Holden Wood gathering grounds are within the boundaries of the Haslingden Borough. The Calf Hey reservoir receives the water collected on the slopes in the upper or western end of the valley, while the overflow from this reservoir, together with some streams and springs, along with surface water from the slopes of the lower part of the valley, feed the Holden Wood reservoir. The Map (II.), prepared for me by Mr. Cartwright, the Borough Engineer, shows both of these gathering grounds and their respective reservoirs. The division between the two catchment areas was not marked upon the map by Mr. Cartwright, but from the results of my own observations, together with information supplied to me on the spot by residents, I have myself indicated the division on the map, and this I believe to be substantially correct.

Calf Hey gathering ground has an area of 872 acres. Upon it are 32 inhabited houses, having a total population of 128 persons. The houses are scattered along the slopes of the valley; a few of them are situated near the reservoir, and certain others are in more or less dangerous proximity to feeders or tributary streamlets. A main road from Haslingden to Blackburn runs along the whole north side of the valley, and passes the reservoir at a distance of about 600 yards. There is one roadside public house upon the catchment area. The land is under grass, meadows occupying the lower slopes, while pastures and rough moorlands lie higher up. Some of this high land appears to be of very little value. The extreme western end of the gathering ground lies about three miles from Haslingden, and the reservoir is about two miles distant from that town. Formerly there were a larger number of inhabited houses upon this area; at present ten houses are unoccupied, several of these having for years been uninhabited, while others have more recently been vacated owing to dilapidations. A number of the properties are already in the possession of the Bury Corporation, whose object it is, by agreement or by compulsory purchase through Parliamentary powers, to acquire the lands and tenements upon this area, with the laudable intention of depopulating it as far as possible, for the better protection of their sources of water supply. The excrement disposal for dwellings hereabouts is by means of privies discharging down the slopes near the houses. The privies, in many cases without doors, are constructed of "dry stone," *i.e.*, stone walls without mortar setting. There are only two pail closets on the gathering ground: one of these when I saw it had been neglected and was overflowing on the ground. Sometimes the privy discharges directly upon an open manure heap, the liquids from which trickle over the sloping surface towards the water courses. The slop water from the houses is commonly thrown out upon the grassy slopes to soak down hill away from the dwelling. Sometimes a "grip" or little channel is cut in the grass to facilitate the passage of liquids in the direction of the reservoir or its feeders. The privy contents as well as the cow-stable manure are at certain seasons of the year spread upon the meadows sloping to the reservoir or its tributary streams. Some springs were seen issuing from the hillside not far below wet and open dung heaps. Occasionally a rill flows through a farm yard unpiped, on its way to the reservoir, and passes dangerously near uncovered dung heaps and other filth.

The slopes immediately to the north of the reservoir are liable at present to pollution from a group of 5 houses, one of them a farm, containing a total population of 21 persons. These dwellings are situated only about 160 yards from the water's edge. There are three privies here, each discharging its contents down the slope: two wet manure heaps also drain down the hill, as also does the slop water, which can be traced in black pools in the grass. The solid contents of the privies and the cow-stable manure are used to top-dress the meadows stretching towards the reservoir. It is with a view of



MAP II.

SHOWING THE CALF HEY AND HOLDEN WOOD GATHERING GROUNDS.

Places marked thus ⁚⁚ *show where the meadows were noted as having been heavily top-dressed with human excrement, As to this see text of the report.*

Scale 3 inches to the mile.

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On the Sources and Circumstances of the Bury Corporation Public Water Service; by Dr. Bruce Low.

preventing pollution from these and other houses that the Bury Corporation are trying to purchase, by agreement or compulsion, the lands situated upon this watershed, especially those round the reservoir. It is evident that the presence of inhabited houses, such as these, so near the reservoir is a constant menace to the safety of the supply.

A number of footpaths intersect this gathering ground in different directions. It is proposed to close them as well as some roads that are not now of much use, since the farmhouses they served are now out of occupation or are about to go out of occupation.

The two main streams converging to the reservoir are each furnished with a series of small dams, which are constructed with a view of detaining gravel and silt washed down the steep watercourses by floods. One of these tributary brooks has a number of trees growing on its banks close to the running water. In the pools and shallows of this stream dead leaves collect, and at the time of my visit the channel in places was full of dead and decaying vegetable matter.

A bye-wash has been constructed round the south side of this reservoir, by means of which storm water can, if desired, be conveyed away past the Calf Hey reservoir to that at Holden Wood, about three quarters of a mile lower down the valley.

A small service reservoir, holding about 700,000 gallons, in connexion with the Calf Hey supply has already been mentioned. It is situated nearly a mile away and close to the north eastern corner of the Holden Wood reservoir but on a higher level (*see* Map II.). The water in this reservoir was some 18 months ago undoubtedy polluted for a time by excrement in the following fashion. The contractor employed by the Haslingden Corporation to empty ashpits and pail closets in the outlying districts to the west of the Borough,* selected a field adjoining the service reservoir as a tip for the ashpit refuse. This tip was on a higher level than the reservoir, so that wind could blow the dust from the tip over the low wall into the adjacent water, the tip being within 40 yards of the reservoir. But, worse than this, the contractor selected a field, abutting on the north and west of the reservoir on a slope leading down to it, upon which to dispose of the contents of the pail closets collected in the vicinity. The excrement was thickly spread on the grass within 18 yards of the water. Owing to the banking of the service reservoir the fluid filth could not pass directly into the water, but the wind blew quantities of paper, contaminated by human excrement, into the water, from which the waterworks foreman informed me he had to remove it day by day. Representations were made by the Bury Corporation to the Haslingden Town Council as to pollution of this reservoir, and this had the effect of stopping the contractor from disposing of the filth upon the portion of ground in question, and causing him to take it elsewhere. It is evident that dried excrement, apart from the contaminated paper, could easily have been, and probably was, blown at the time into the service reservoir.

(2.) *The Holden Wood Gathering Ground*, as has been said, lies close to Calf Hey and in the same valley. It has an area of 1,313 acres. Upon it are situated 125 inhabited houses containing a population of 610 persons. Within this area are situated also two

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* The Haslingden Corporation by their own servants do the scavenging of the populous parts of the Borough. It is only the scavenging of the rural or semi-rural portions that is undertaken by a contractor.

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cotton weaving mills, each being upon one of the two main tributary streams that feed the reservoir. One mill employs at present 114 hands, while the other has as many as 130. Each mill is provided with tub-closets emptied, I am told, by the Haslingden Corporation's contractor. Urinals are provided for the males; one of which discharges into a stream and the other upon a field adjoining a brook. Upon this catchment area are also situated some brick and terracotta works, employing at present 50 men and boys: the works are now in process of extension, and it is stated that, during the coming year, at least 100 workers will be employed. There are three stone quarries now being worked upon this gathering ground, employing among them at present some 65 quarrymen. There are upon it two graveyards; one, in connexion with the church at Haslingden Grane (*see* Map II.), lies on a slope less than 400 yards from the Ogden brook, the main stream entering the reservoir. From statements made to me by a resident in the locality, it appears that when graves are dug in this churchyard they often have to be baled out, the land is so wet. I noticed at least two springs coming to the surface in the meadows a little distance down the slope between the churchyard and the stream. The second graveyard is small, having only 42 grave spaces, of which about three are as yet unused. It is connected with a chapel at Haslingden Grane and no further interments will be allowed in it when the three unfilled graves have been occupied. There are two roadside public houses on this gathering ground; and also a school. I counted 61 privies, 35 tub-closets, and two water-closets upon the Holden Wood catchment area. Some of the privies discharge upon dung heaps. The privy contents, alone or mixed with cow dung, are used to top-dress the meadows. Some farmers buy stable manure in adjacent Urban Districts for spreading on their grass land. The dung heaps are often wet, the fluid filth soaking away into the grass or trickling downhill towards the water courses. The two water-closets mentioned above are in the same house and discharge along with the slop water into a cesspool which has only been emptied once in four years. This cesspool is situated on the slope about 300 yards above the reservoir. Slop water from dwellings here is usually thrown out on the grass, or as regards some groups of houses it is conveyed in pipes to a streamlet, or is delivered on steep banks a few yards from the flowing water. A number of the population are engaged in agriculture, chiefly dairy farming. I heard of over 260 head of cattle feeding on the pastures of this watershed. I had no means of ascertaining the number of pigs, but one farmer admitted that he had 28 upon his premises. Water coming from the higher ground flows in rills or tiny rivulets down the steep slopes, and passes sometimes near houses or through farm yards, at times in open channels, occasionally in rubble drains, so that fluid filth can readily enter the water, from dung heaps, slop water channels, or privies.

The tub or pail-closets on this gathering ground, more especially in the hamlets of Haslingden Grane and Heap Clough (*see* Map II.), neither of which has any proper sewerage, are emptied at short intervals by the contractor employed by the Haslingden Corporation. Sufficient care in the disposal of this human excrement is not taken at all times, by private persons or by the contractor; nor are the brooklets or feeders of the reservoir apparently protected in any way from excremental pollution. For instance, near a couple of cottages I saw five heaps of tub-closet filth "dumped" down on a grassy slope

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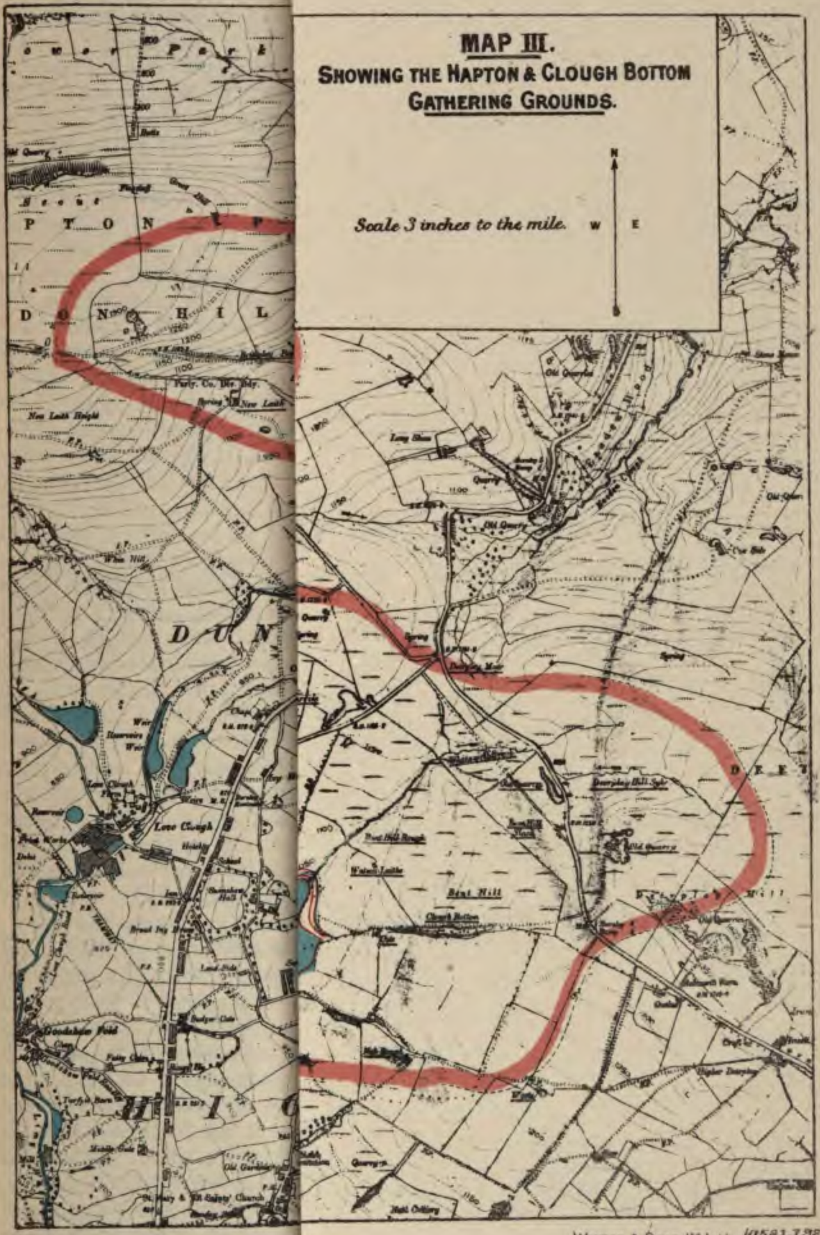
within a few yards of a rill on its way to the reservoir, which was only 400 yards distant. At another place I saw a steep meadow slope which had recently been top-dressed with human excrement at a point only 18 yards from the main tributary of the reservoir. A privy midden, open, wet, and foul, was seen discharging on the sloping surface only 11 yards from the flowing water, and a large pool of black slop water was seen soaking to the stream, only eight yards distant. The worst example met with of this disregard for the purity of the water flowing to the Holden Wood reservoir, is the following. At the time of my visit I saw, situated only 130 yards from the main brook flowing to the reservoir, a meadow, a portion of which, measuring *114 yards by 40 yards*, had been recently heavily top-dressed with tub-closet filth. It needed only heavy rain to wash a large part of this mass of human excrement down the surface of the slope to the stream and thence into the reservoir. I was informed that the filth in this instance had been spread on the meadow by the Haslingden Corporation's Contractor. I heard of similar instances where, in the past, meadows abutting on the main streams had been thickly spread with human excrement from tub-closets.

The Holden Wood catchment area is crossed by a number of footpaths leading from one group of houses to another, or from one farm to another. In the new Bill it is proposed by the Bury Corporation to obtain power to close these footpaths, and some of the smaller roads. The high-road from Haslingden to Blackburn (*see* Map II.), passes from east to west through the whole length of the gathering ground on the north side of the reservoir at a distance varying from 150 yards at the nearest, to 300 yards at the furthest point from it. The road washings are allowed to pass down the slopes or find entrance into the rills and rivulets that pass underneath the road on their way to the reservoir. The road is much used by work people on their way to the quarries, mills, and brick-works, as well as by ordinary travellers and tramps. Frequent evidence was met with showing that the roadsides or the fields adjoining the road were commonly used by workmen and others as places for defæcation. Though two privies are provided at the brickworks (these privies, by the way, when seen by me were greatly in need of being emptied), a field close to the works was thickly littered in places by human stools; the field being apparently preferred to the privies by the workmen. It is needless to multiply examples of the ways in which this gathering ground is polluted. The pollutions are many and various. It is impossible to consider water collected on an area such as this as being, under the circumstances, free from danger to those drinking it. The use of this reservoir should, in my opinion, be limited to compensation purposes, and its connexion with the Bury mains should be cut off.

(3). *Hapton or Clow Bridge Gathering Ground* lies about 10 miles due north from Bury. It is situated partly in the Borough of Rawtenstall and partly in the Burnley Rural District. A high ridge separates this gathering ground from that of Clough Bottom (*see* Map III.). The Hapton ground comprises the two sides of a valley which has been dammed across in constructing the reservoir. The main road to Burnley passes through the catchment area from south to north and skirts the reservoir for a short distance. The collecting area has been increased by the construction of a rubble drain catch-water (*see* Map III.) which conveys the water from several springs to the reservoir. This catchwater gathers also surface water from the meadows or pastures through which it passes. The gathering ground is 1,303 acres in extent; upon it are 22 inhabited houses having a total population of 110 persons. In this number are not included a row of 11 houses standing on the west side of the Burnley road near the north-west corner of the reservoir. This row of houses has a population of 53; it drains into a sewer laid in the high road and this is stated to disconnect it from the watershed. The houses have pail closets which are said to be regularly emptied and the contents removed outside the catchment area. Near this row of houses is a "Coal-stay" to which coal from a pit, not on the watershed, is brought by a tramway and loaded into carts for local use. On the southern confines of the gathering ground is a coal pit, Gambleside (*see* Map), employing at present some 25 hands. A second pit lies nearer the reservoir and is connected with the other, though it is now only used as a pumping station. The water pumped from the pit is usually muddy; it flows to a so-called rubble "filter bed" close to the reservoir into which the "filtered" water flows. The results of this "filtration" are not satisfactory and this water would be better excluded from the Hapton supply. Farmhouses are dotted along the hillsides. One farmhouse, with three inmates, lies close to the reservoir bank, viz., Cronkshaw Hill (*see* Map III.); owing to its proximity to the water, this farm has to be constantly watched to prevent the inmates polluting the reservoir. A number of houses are now unoccupied, and some of them have become already the property of the Bury Corporation, whose endeavour it is, as has been said, to reduce, as far as possible, the number of human habitations upon this area. The majority of the farmhouses and cottages are supplied with privies—only four have pail closets. Sometimes proper care is not taken in disposing of the contents of the latter. For example, I saw a collection of pail closet filth, from a house containing nine inmates, which had been deposited in a heap on a steep slope near a feeder of the reservoir, at a point only some 300 yards from the latter. Some privies discharge upon dung heaps. Slop water, in certain cases, mingles with the liquid manure from dung heaps and soaks away down hill towards the water courses. On the east side of the reservoir the meadows reach nearly to the water's edge, and are separated from it only by a dry stone wall. These meadows are heavily manured with cow dung, and privy contents are also spread on the grassy slopes sometimes once, sometimes twice a year; some farms are provided with tanks to receive liquid manure, which is disposed of on the grass land. Occasionally a small rill passing downwards from the high ground towards the reservoir flows, with little or no protection, near to a house or through a farmyard. In one instance, the rill was flowing past the house, down the steep slope in a covered rubble drain which ran within a few yards of an uncemented cesspit privy. Some of the smaller streams are choked by vegetation, or their banks have in places been trodden down by cattle, causing obstruction of the channels. Some of the rivulets pass through open pools and cattle drinking places before entering the reservoir. The public road, already mentioned as skirting the western side of the reservoir, is shut off from it by a wall, by a deep overflow channel, and for some distance by an embankment. On the eastern side, however, a public footpath passes along the bank of the reservoir towards the Gambleside Lower Colliery. This footpath exposes the reservoir



MAP III.

SHOWING THE HAPTON & CLOUGH BOTTOM GATHERING GROUNDS.

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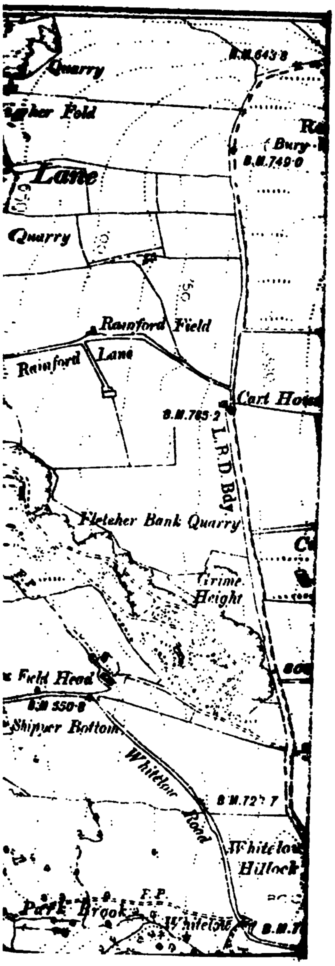
to some danger, as certain thoughtless persons have been known to defæcate on its banks. The waterworks foreman has had, I understand, to take proceedings in the past against such parties. The Bury Corporation seek powers in their new Bill to close this footpath, as well as several others which traverse the gathering ground in various directions. Proceedings, or threats of proceedings against offenders, have been initiated by the Bury Corporation in past years (1) to restrain persons from bringing dogs to bathe in this reservoir; (2) to stop the manuring of land with human excrement close to feeders of the supply; (3) to prevent the bringing of slaughter-house manure from a neighbouring large town to spread on land near streams flowing to the reservoir. I learn, also, that the waterworks foreman at Hapton (who appears an intelligent and zealous official) has rescued at least one would-be-suicide from drowning in the reservoir. In former years, sheep-washing was done by the farmers in the main stream, a little above the reservoir; this was stopped by legal proceedings. It is now done about a mile off, with certain necessary precautions, to prevent pollution of the stream.

(4). *Clough Bottom Gathering Ground*, as has been said, lies close to Hapton, separated from it only by an intervening hill, one (the west) side of which drains into Hapton reservoir and the other (the east) into Clough Bottom (*see* Map III.). A high road from Rawtenstall to Burnley runs through this gathering ground from S.W to N.E.; another road crosses it from S.E. to N.W., and joins the first mentioned on the northern edge of the water-shed. The catchment area comprises 736 acres and upon it at present are only eight inhabited houses with a total population of less than 30. This number does not include one or two houses close to a brick and tile works, on the west side of the main road. These houses have been disconnected from the water-shed by a sewer in the road, and this is said to carry off all slops, and to intercept the surface water flowing from the vicinity of the dwellings. Some farmhouses on this ground are now uninhabited; some of them are in the possession of the Bury Corporation who are desirous of acquiring the others with a view of depopulating the gathering ground for the better protection of the water supply. As at Hapton, the area of the gathering ground has been increased by a catchwater (*see* Map III.) which receives the surface water from an area that otherwise would not drain into the reservoir. This catchwater is open, and is solidly constructed with "pitched" stone, and some care has been exercised in protecting it from liability to pollution from certain farms situated near it. For instance, at Lower Cross Farm, which is close to the catchwater, the latter passes through a covered way, concreted at the bottom, cemented at the sides and finished with a layer of puddled clay round the outside. The house and farm drainage is conveyed across the culvert in a pipe to a cemented tank on the slope below the level of the catchwater, so that no soakage can contaminate the water. A pail closet is supplied for the use of the inmates (but this was not in a satisfactory state when inspected by me). On the other hand, at Windy Bank, a small farmhouse, there was a dilapidated privy discharging, along with the slop water drain, on the surface of the steep slope, only 50 yards above the open catchwater. One farmhouse (Middle Cross) had a dilapidated privy, now transformed by the occupier into a hen house; the four residents at the farm have to defæcate either in the open fields or go to a privy at an adjoining unoccupied farmhouse. Middle Cross farm is situated on high ground overlooking the catchwater which passes a little over 200 yards below. A small tributary stream to the north side is kept in a turbid state by ducks and geese at another farm situated some 600 yards from the reservoir. The farmer keeps, it is said, from 600 to 700 head of poultry. He carts manure from a neighbouring large town to spread on his meadows, on which the contents of the farmhouse privy are also disposed of. The slop water and house drainage collect in a black pool in the field adjoining the house; the contents of the pool overflow into the before-mentioned streamlet in wet weather. If the Bury Corporation succeed in acquiring the properties they seek upon this gathering ground, the risks of excremental pollution of the water could with due care be almost, if not altogether, removed. A number of footpaths cross the gathering ground, some of them but little used. As a matter of precaution the Bury Corporation seek powers in their new Bill to close these footpaths and prevent persons trespassing upon them.

The reservoir is furnished with a bye-pass channel for storm water, which can, if necessary, be excluded and carried off into a stream at a point below the reservoir embankment (*see* Map III).

(5.) *Harden Clough, or Shuttleworth Gathering Ground*, lies about a mile and a half to the north of the Borough of Bury, and is situated in the Bury Rural district. It has an area of 206 acres and contains no inhabited houses (*see* Map IV.). There are two farms on the edge of this watershed, but the drainage of these houses flows in an opposite direction into another area altogether. This gathering ground is almost all moorland, but there are upon it two ploughed fields, one of which was in turnips and one in corn last year. These must require manuring, and are therefore undesirable upon a gathering ground, the more so as they lie only about 200 yards from one of the reservoirs. There are some meadows on the northern slopes, but on the south is rough moor, carrying only sheep. A streamlet flows through a deep and narrow ravine which traverses the centre of this gathering ground. There are two reservoirs (*see* Map IV.), one at the lowest point, the other some distance above it. A public road skirts the northern boundary and passes close to the lower reservoir, which is inadequately fenced in; so that tramps and others can easily get from the road on to the reservoir embankment. I saw in one place human excrement which had been recently deposited by some passer by upon the top of the embankment. Such occurrences could be prevented by the erection of a proper wall or an unclimbable fence. The upper of the two reservoirs cannot at present be filled owing to an undiscovered defect in its construction, which allows of leakage. It is, I understand, proposed to enlarge the area of this gathering ground, and also to construct a new reservoir at a point between the two existing ones with a view to increase the storage. Provision for these additions is made in the new Bill now being promoted by the Bury Corporation.

(6.) *Gin Hall Gathering Ground* lies, with the exception of a small portion, within the boundary of the Borough of Bury, on the northern outskirts of that town. The catchment area comprises a shallow valley with grass fields on either slope, and through it flows a small streamlet (*see* Map IV.). Its area is 202 acres. Upon it are a factory and nearly 40 houses, but the main body of these, as is indicated upon the map by the coloured line marked round them, are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Cart Ho
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Fletcher Bank Quarry
Grime Height
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disconnected from the gathering ground by a sewer, which carries off the slops and liquid drainage. There is a cluster of 16 of these houses in two groups situated upon the eastern slope of this area. The group nearest to the stream consists of a row of ten cottages, the slop water from which is intercepted by the sewer above mentioned; but the excrement disposal is by means of open midden privies, with unprotected sides and bottoms, receiving surface water as well as the drip from the privy roof. The nearest midden is only 150 yards distant from the stream, the ground falling sharply from the former to the latter.

The cottage of the Waterworks Foreman stands close to the reservoir at its western side. This cottage when I visited it had at the back a midden privy, the contents of which have to be dug out and then wheeled in a barrow across the road past the side and front of the house, to some adjacent grass fields for disposal. An adjoining house had the same sort of arrangement, both privies being within ten yards of the reservoir. Fouling of the surface of the ground must be probable and easy when these middens are being emptied. I learn since my visit that the Bury Corporation are substituting pail closets for these two objectionable midden privies.

The grass fields of this area are regularly top dressed with manure. I saw on one field what appeared to me to be suspiciously like midden privy refuse. A main road skirts the whole of the western side of the gathering ground passing close to the reservoir. Another road skirts the eastern boundary and runs along the crest of the ridge overlooking the catchment area, which is also crossed at right angles in two places by public footpaths. The footpaths are not fenced off, and the result of this was seen at my inspection, when the deposit of recent human stools at four places was noted. Some of these stools were close to the running water, within less than 100 yards of the reservoir. The streamlet in one place forms a drinking place for cattle, and its bank here was trodden down and befouled with cows' excrement within a short distance of the reservoir. A bye-pass channel skirts the east side of the reservoir, so that the Gin Hall stream can be shut off altogether from the water supply if desired. From the circumstances of this gathering ground, notably the free access it offers to foot passengers in all directions, with consequent danger of defilement as mentioned above, together with its proximity to a populous borough, I am of opinion that the use of this section of the supply is attended with considerable risk to those who drink it. The reservoir at Gin Hall is practically a service reservoir, for it receives not only the water from the Gin Hall streamlet (an amonut comparatively insignificant), but also the waters from the mains bringing the supply from Calf Hey, Harden Clough, and Hapton. The Gin Hall reservoir contains therefore a mixture of water from four sources.

I am unable to supplement the above brief description of the gathering grounds by quoting the results of any recent official analysis—chemical, microscopical, or bacteriological—of the various waters comprised in the Bury public service. I am informed, however, by the Corporation that an elaborate and extensive inquiry is now being carried out on their behalf by Professors Delépine and Dixon, of Owens College, Manchester, embracing an inspection of the sources from which the water is obtained, together with chemical and bacteriological examination of samples taken at various points on each gathering ground. The report of these experts has not yet come to hand. When available it will doubtless afford useful information regarding the quality of the various waters forming the Bury public supply.

The question of impurities being present in the Bury water service has been at times locally investigated. As far back as the autumn of 1883 the Rev. W. Hume Elliott, of Ramsbottom, made an inspection of the Calf Hey and Holden Wood gathering grounds, and reported in the local papers a number of conditions which, in his opinion, endangered the water flowing to the reservoirs. In September 1897 he repeated his inspection, and on this occasion he was accompanied by a medical man. Both of these gentlemen reported conditions likely to cause danger to the water supply. The Rev. W. Hume Elliott, in a communication to the newspapers, stated that the pollutions he had reported in 1883 still remained practically undealt with in 1897. A microscopic examination of the water was made in 1893 by Mr. J. E. Lord, a naturalist, of Rawtenstall, who reported to the Rawtenstall Corporation that he found in the samples he examined a quantity of "a genus of fresh water Algæ, the Oscillatoria tenuis," whose normal habitat, he added, was "highly impure shallow water covering stones and mud." He also mentioned the finding of other organisms, including Rotiferæ, Diatomaceæ, and some Nematode worms. In the autumn of 1897 Dr. Hugh Laurie, of Ramsbottom, made a microscopic and bacteriological examination of samples of the public water supply. He found under the microscope water Algæ; several forms of animal life—Protozoa and Crustaceæ; also Trematode and Nematode worms. His bacteriological examination showed the presence of an "abundance of liquefying organisms"; cultivations on nutrient jelly showed that in a little over 24 hours the medium "literally teemed with bacteria." In sub-cultures he isolated several varieties of bacteria, one of which he considered as indistinguishable from Bacillus Coli Communis.

In reply to those who have accused the Bury water supply of being dangerous to health, it has been contended by the Bury Corporation that no evidence of injury to health has been adduced. It has been also confidently affirmed in this connexion that, though the water is admitted to be at times discoloured, yet it is devoid of danger to consumers.

But no one who has visited the gathering grounds of the Bury Corporation can deny that, upon some of them at least, there exist conditions which must foul the water and which are highly favourable to the spread of water-borne disease, should the specific poison of such disease by any chance be introduced upon them from without.

It is believed by the Bury Corporation that if the various sources of pollution upon the gathering grounds could be dealt with and removed, as they say is now being done, and that if such water as could not be thus rendered safe were excluded altogether from the reservoirs, the quality of the Bury water service would be vastly improved, and become practically safe without the need of sand filtration. This having been done they think that the carrying out of regular and systematic flushing of the mains, and gradual replacing of the old encrusted and corroded pipes with modern ones properly prepared against internal encrustation, would result in a total cessation of the complaints that have hitherto been so frequent. The Bury Corporation it appears are advised that the construction of filter-beds would entail an expenditure almost altogether beyond their present resources, and that even then no absolute security against water-borne disease would be attained. They urge, therefore, that to obtain freedom from contamination at the sources upon the gathering grounds would be a better safeguard of their water than sand filters, which require so much supervision, and which cost so much money. They point out, too, that for some years the Bury Corporation have been supplying water to neighbouring districts at a pecuniary loss, the yearly receipts from water rents and charges being less than the annual expenditure incurred in carrying on the waterworks undertaking. Wherefore their contention is that if any large or expensive changes are to be introduced,—such as the construction of new reservoirs, the purchase of the gathering grounds, the addition of sand filtration of the water,—the districts which, besides Bury, share in the advantages of an improved and adequate supply, should share also their proportion of the cost incurred. On the other hand, the districts receiving the Bury water have through their representatives held meetings to consider what steps should be taken with regard to the proposals contained in the new Bill now being promoted by the Bury Corporation. At the date of my visit no definite course of action had been agreed upon by these representatives, but I was led to infer that if the Bill proposed any increase in the water rates, it would be strongly opposed by all the District Councils concerned, and I have since been informed that the whole of the eight districts supplied by the Bury Corporation with water have decided to oppose the proposed Bill.

December 18th, 1897.

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REPORT on the GENERAL SANITARY CIRCUMSTANCES of the BOROUGH of BEWDLEY; by DR. THEODORE THOMSON.

On October 10th, 1896, the County Council of Worcestershire addressed to the Board a letter, in which they stated that they desired to make a representation to the Board under Section 19 of the Local Government Act, 1888, that "the Corporation of Bewdley, in "the County of Worcester, are in default in not putting in force "their powers under the Public Health Act, and particularly as to—

"1. Providing a proper water supply for the borough.

"2. Putting in force the Housing of the Working Classes Acts.

"3. Providing the borough with efficient sewers, and preventing "the pollution of the River Severn by the discharge of their "sewage therein."

After some correspondence by the Board with the County Council of Worcestershire and with the Town Council of Bewdley it was determined to make investigation by one of the Board's Medical Inspectors respecting the sanitary circumstances of the Borough of Bewdley and as to administration by the Town Council. In accordance with the Board's instructions, I visited Bewdley on January 20th, 1897, as well as on several subsequent occasions, making inquiry in the sense indicated. The following facts relative to the subject of this inquiry came to my knowledge in the course of my investigations.

The borough of Bewdley, in the County of Worcestershire, with an area of 2,105 acres, had at the Census of 1891 a population of 2,876, occupying 649 houses. At the Census of 1881 the population was 3,088, while inhabited houses amounted to 695. In the decade 1881-91, therefore, there was a small decrease of both the population and the inhabited houses of the borough. The present population resides mainly in what may conveniently be termed the "town of Bewdley," which lies at the eastern extremity of the area constituting the borough; the remainder of that area being very sparsely populated.

The town of Bewdley, situated on the west bank of the River Severn, occupies a flat strip of ground that here skirts the river, and the steep acclivities into which this strip merges at its western border. Geologically speaking, the town is on the Bunter Beds of the New Red Sandstone and on the Coal Measures, against which the New Red Sandstone is here thrown by a "fault." On the flat strip skirting the river these formations are overlaid by a few feet of drift, consisting of sand and gravel, as well as loam, but on the rising grounds to the west there is no overlying drift, and, indeed, the rock of both Coal Measures and New Red Sandstone frequently crops out on the surface. The inhabitants of Bewdley are mainly engaged in carpet making, horn work, brass work, tanning, and agricultural pursuits. Those, it may be noted, who are engaged in carpet making, follow their trade, not at Bewdley, but at Kidderminster, some three miles from Bewdley, walking to and from Kidderminster daily.

The mortality of Bewdley in recent years, in its relation with that

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of England and Wales and of certain country districts, may be gathered from the following figures:—

Period.	Number of Deaths from all causes in he Borough of Bewdley.	Death-rate per 1,000 living in the Borough of Bewdley.	Death-rate per 1,000 living in England and Wales.	Death-rate per 1,000 living in the Country Districts of England and Wales.
1887-96... ...	499	17·3	18·6	16·9

From these figures it appears that, in respect of general death-rate, the position of Bewdley is between that of England and Wales and that of the country districts of England and Wales. It is noteworthy that of the 499 persons who died in Bewdley in the 10 years 1887-96, no fewer than 131 were infants under one year of age. During the same period there were 797 births in Bewdley, so that the infantile death-rate was 164 per 1,000 births. During these 10 years the infantile death-rate in England and Wales as a whole was 148 per 1,000 births.

Streets and Dwellings.

The town of Bewdley comprises some eight or ten streets. The roadways of these streets are macadamised, and are, with occasional exceptions, in fairly good repair. The side paths are, for the most part, paved with flags or bricks; but there are also side paths which are unpaved. Street gutters are usually lined with cobble stones; and channelling of this sort is frequently irregular, permitting accumulation of slops and filth.

Dwellings have generally a sufficiency of air space around them. Back yards are in some instances paved, wholly or in part, with brick or other material; and, while in some instances yard paving is in good condition, in others it is broken and uneven. Yet other yards are devoid of paving of any sort. Portions of back yards attached to dwelling-houses are not infrequently cultivated as gardens, but many houses are unprovided with garden ground.

Very many dwellings in the town of Bewdley are old, badly lighted, dilapidated, and damp. Indeed, of the large number inspected by me during my visits to Bewdley there were few that did not present some defective condition or conditions.

> *Welch Gate* is in part in very bad repair, the surface of the roadway irregular, and worn away by storm water in its centre; proper channelling is absent from parts of the street, and where channelling exists it is formed mostly by irregular cobbles.
>
> *Welch Gate, Court* 4: this court is partially paved with brick, in bad repair. No. 5 in this court has very damp walls, and the tenant states that rain comes through the roof into one of the bedrooms. No. 2 is rather damp on the ground floor, and is very badly lighted.
>
> *Bark Hill, No.* 8: the living room on the ground floor (16′ × 8′ and 7′ in height), is lighted by a window, which is only 3′ × 3′ 3″. The occupiers of this house keep the door open as much as possible, so as obtain better light.

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Bark Hill, No. 5: according to the tenant, "it rains in all over the ceiling," off a large part of which plaster has dropped; the back wall is damp.

Sandy Bank, No. 20: the back yard of this house is paved with bricks, but the paving is in very bad repair, large numbers of bricks being broken, and the surface of the yard very uneven.

Wyre Hill, No. 33: this house is dilapidated, and also badly lighted; the top floor is now disused, the windows on this floor being mostly unglazed, and much of the ceiling plaster having fallen down; the staircase leading to the top floor is ricketty and unsafe.

Sewerage and Drainage.

The town of Bewdley has three sets of main sewers. Broadly speaking, one set serves the northern portion, a second set the central portion, and the third set the more southern parts of the town. Generally these sewers are barrel-shaped, and are constructed of bricks set in mortar. Their size varies considerably; but very commonly they are stated to be two feet or even three feet in diameter; dimensions which, in more than one instance, are accounted for by the fact that the sewer has been laid along an old water-course, of which the stream now flows along the sewer. Occasional excavations have shown that these sewers are in many places in defective condition, and contain offensive deposits of silt. For the most part they are unprovided with means of ventilation; but in a few instances special shafts have been connected with them to this end. None of the sewers are provided with either manholes or lampholes. The only means of flushing attempted is by emptying bucketsful of water down street gullies, the water being conveyed for this purpose in a water-cart. The three sets of sewers all discharge their contents in a crude state into the River Severn, each set having a separate outfall opposite respectively the north-eastern extremity, the centre, and the south-eastern extremity of the town.

House and yard drainage is effected mainly by stoneware pipes, usually 6″ or 4″ in diameter; but there are said also to be some old brick drains that serve this purpose, while there are certain houses entirely unprovided with means of drainage. The inhabitants of these undrained houses either throw their slops on the yard surface or into the street gutter. There are also a considerable number of open channels in yards, lined usually with brick or cobbles, which convey drainage to covered drains. These open channels are sometimes defective, and allow stagnation of slop and surface waters. House drains are seldom properly disconnected from street sewers. Sink and waste pipes are usually disconnected from the drains to which they discharge.

Welch Gate, Court 4: on the occasion of my visit this yard drain was blocked, and a large pool of sewage and surface water had accumulated in the yard.

Bark Hill, 19 & 20: these houses are devoid of drainage arrangements, and slops are thrown upon the adjacent public road.

Bark Hill, 14, 15, & 16: waste water from a sink pipe discharges on the surface of the ground, into which it percolates; the yard drain was blocked at the time of my visit, and a pool of waste and surface water had accumulated in the yard.

Sandy Bank, 24 & 25: these houses have no drainage arrangements, and the tenants throw their slops on the surface of the yard.

Wyre Hill, 23 & 24: house and yard drainage discharges, not to a sewer, but to an open ditch in the rear of the houses.

Lax Lane, 40 & 41: the channelling leading to the yard gully is defective.

Disposal of Excreta and House Refuse.

The prevailing system of excrement disposal is by cesspit privies, which are in almost every instance offensive nuisances. The cesspit, usually of large size, is nearly always sunk a foot or more below the ground level; and in this pit large quantities of decomposing excrement and urine are allowed to accumulate. There are also a few pail-closets and water-closets; the pails become coated with dried excreta, and thus create nuisance, while the water-closets are ordinarily hand-flushed hoppers, which frequently become foul or get blocked. House refuse is in some instances stored in large open brick ashpits, usually sunk below the ground level; in other instances it is allowed to accumulate in heaps in the yard or garden; while occasionally it is stored in small moveable receptacles, such as pails or tubs. The Town Council of Bewdley pay a contractor to remove both excreta and house refuse; the contractor undertaking to remove these matters as required, and to convey and deposit them not less than a mile from the centre of the town of Bewdley. He is, however, entitled to charge the occupiers of houses, the excreta or refuse of which he has been asked to remove, a sum which may be 1*s.*, 1*s.* 6*d.*, or even more; in default of which payment he may refuse to undertake such removal, which then devolves on the occupiers. Some occupiers employ privy contents for garden purposes; but many have no garden on which these matters may be used. Occupiers, when they themselves remove ashes, generally convey them to the banks of the Severn, and there tip them; while others throw them on the surface of yards or on neighbouring paths and roadways. In this way considerable addition has been, and is still being, made to the river banks, and to yards, paths, and roadways in the town. Whether removed by the contractor or by the occupier, the contents of cesspit privies and ashpits are wont to accumulate over long periods, many of these receptacles being cleansed as seldom as once a year.

Welch Gate, Court 4: water-closet, of long-hopper pattern, hand-flushed, pan thickly coated with black filth, soil pipe discharging directly to the sewer without any disconnecting trap; excreta deposited here and there on the floor of the water-closet building, tenants apparently finding the pan too filthy for use; ashpit is 6′ × 4′ 6″, and quite full.

Venus Bank, No. 1: cesspit-privy, with uncovered pit, in which there is a large accumulation of offensively smelling excrement and liquid refuse, part of which leaks from the pit and trickles over the neighbouring ground; ashes are stored in pails and taken away by tenants.

Bark Hill, No. 5: ashes are thrown by the tenant on the public path in front of the house.

Bark Hill, No. 3: a large pile of ashes heaped up in a corner of the yard; according to the tenant there has been no removal of ashes from these premises for a year or more.

Dog Lane, No. 21: ashes removed by tenants and tipped on the banks of the Severn.

Severn Side North, No. 11: triangular uncovered ashpit, quite full, measuring 13′ × 13′ × 7′; cesspit-privy with cesspit sunk below ground level and stinking.

Lax Lane, Court 1: according to tenants, ashes are tipped on the bank of the Severn, but the whole surface of the back yard is littered with them.

High Street, Court 1: cesspit-privy, of which the cesspit is 3′ × 4′, and sunk below level of ground, containing large amount of excreta and liquid refuse, and smelling offensively; open ashpit, sunk about a foot below ground level, and measuring 5′ × 6′.

Wyre Hill, No. 6: cesspit-privy, over-full and leaking over the privy floor.

Wyre Hill, Nos. 8-11: two hand-flushed long-hopper water-closets, both blocked, the pan in one instance being quite full, and in the other instance half full of excreta and liquid refuse.

Wyre Hill, Nos. 34 and 35: in front of these houses the public road is littered with ashes and vegetable refuse.

Water Supply.

The water supply of the town of Bewdley is derived in part from private wells and in part from public wells. Of these latter there are five within the town, mainly in its central, northern, and western parts. Considerable numbers of the inhabitants also resort to a public well situated in meadows that lie near the village of Wribbenhall, on the opposite bank of the Severn. Public wells and private wells alike are sunk either in the New Red Sandstone or in the Coal Measures underlying the town; a larger proportion, however, being sunk in the former than in the latter formation. As regards quantity, the supply of many of the private wells is apt to be unsatisfactory; their water either failing altogether or becoming very scanty during periods of drought. Even the public wells cannot all be relied upon for sufficient supply; notably that situated in the part of Bewdley known as "Wyre Hill," which ordinarily goes quite dry in summer. As result of these conditions many people have, during dry weather, to go considerable distances—as much as a quarter of a mile—to obtain water for drinking and cooking purposes. As regards quality, these local supplies are equally defective. The public wells, indeed, are stated to be lined with bricks in cement in the upper parts, to lessen risk of percolation of surface water into them; but private wells are rarely thus protected. All wells, however, whether public or private, are sunk into formations necessarily largely fouled by excremental and other refuse matters from the leaking cesspits, ashpits, sewers, and drains with which the ground under the town of Bewdley is riddled. As a result the water of these wells is liable to dangerous pollution, more especially the water in the wells that are sunk in the readily permeable Bunter beds of the New Red Sandstone. As indicated earlier in this report neither the New Red Sandstone nor the Coal Measures are protected from pollutions of this sort by overlying drift in any great part of the town of Bewdley; while, even in those parts of the town where drift exists, it is so scanty in amount, and so frequently of a sandy or gravelly nature, as to be of little or no value as a safeguard against percolation of foul matters to the underlying strata. Not a few wells in Bewdley, ed, yield a water which the inhabitants of that town will not k, because of its discoloured appearance or unpleasant flavour. even the remainder, which afford a water more pleasant to the and to the palate, cannot, in view of their surroundings, be ded as likely to furnish a supply free from danger to the umer.

Sandy Bank, Nos. 1 and 2: water supply from a public well about 200 yards distant from house.

Dog Lane, No. 21: the private well attached to this house is not made use of by occupants for water supply purposes; the water it yields is said to be of a red colour. Occupants of the house resort to another private well in an adjacent yard.

Severn Side South, Court 3: there is a well in this yard (within 3 feet of cesspit-privy and yard drain) common to occupants of its houses (three in number). But its water is not considered good, and resort is had to the public well in meadows on the opposite side of the Severn (about a quarter of a mile distant).

Wyre Hill, No. 6: water supply from shallow well in yard, in which at time of my visit water stood about 15 feet from the surface of the ground. This well, which is dry-steined, is 12 feet distant from a yard gully and drain taking slops and waste waters. In summer the supply of water usually fails entirely, and tenants then derive their supply from a neighbour's well about 200 yards away.

Wyre Hill, Nos. 8—15: the inhabitants of these houses derive their water supply from a shallow well in which at the date of my visit the water stood 12 feet from the surface of the ground. This well is for the most part dry-steined, while a drain carrying slops and waste waters passes within 12 feet of it, and two hand-flushed long-hopper water-closets, both blocked, are about 15 feet distant. In summer the supply from this well is sometimes insufficient, and resort is had to a public well about a quarter of a mile away.

Wyre Hill, 33—38: these houses are unprovided with any water supply, and their tenants have to resort to a public well about 100 yards away. This public well often goes dry in summer, in which case resort is had to a private well belonging to a neighbour.

High Street, Court 1: The well in this yard has within two feet of it the yard gully and drain leading thereto, into which pass slop and waste waters. In the yard there is also a large offensive cesspit-privy, sunk below the ground level, containing much excreta and liquid refuse: as also a large open ashpit, sunk below the ground level.

Sanitary Administration.

The sanitary administration of the borough of Bewdley devolves pon the Town Council, who meet quarterly. The Town Council elegate their powers under the Public Health Acts—save that of aking rates—to the general purposes committee, a committee of the hole Council, who meet monthly, and report to the Town Council t the quarterly meetings of the latter. There are also highway and anitary committees, who have to report to the general purposes

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committee. The following voluntary Acts relating to sanitary matters were adopted by the Local Authority on February 9th, 1891, and are now in force in the borough; namely—

The Infectious Disease (Notification) Act, 1889.
The Infectious Disease (Prevention) Act, 1890.
The Public Health Acts Amendment Act, 1890. Parts II. and III.

There are also bye-laws for the borough of Bewdley, sanctioned by the Board in 1886, in regard to the following matters:—

1. The cleansing of footways and pavements,
   The removal of house refuse, and
   The cleansing of earth closets, privies, ashpits, and cesspols.
2. Nuisances.
3. Common lodging houses.
4. New streets and buildings.
5. Slaughter-houses.
6. Hackney carriages.

The staff at the disposal of the Town Council for discharge of duties under Sanitary Acts and bye-laws, consists of a Medical Officer of Health, Dr. Webster, who receives a salary of 30*l.* per year, half repaid out of county funds, and of an Inspector of Nuisances, Mr. A. W. Humpherson, who is also Surveyor, and who receives 45*l.* per year, half repaid out of county funds, in the former capacity, and 10*l.* per year in the latter capacity. Neither of these officers gives his whole time to his official duties.

The manner in which the Town Council of Bewdley discharge that part of their duties that has to do with the public health is sufficiently illustrated by their proceedings in regard of the water supply of their district, as set forth in the Council Minutes. From these it appears that, in August, 1880, the Board addressed a letter to the Town Council relative to the water supply of the borough, and the recorded doings of the Council in this matter subsequent to the date mentioned afford instructive, if unsatisfactory, reading. The Board's letter was referred to the "Estate Committee" who in the November following recommended the Council to call in a practical engineer or surveyor to advise as to the best means of supplying water to the borough. Nothing further on this subject appears in the copies of Minutes as supplied to me until more than three years had elapsed; when, in February, 1884, the General Purposes Committee recommended to the Council "that a supply of water to the "borough be provided, and steps taken to ascertain the best means for "obtaining the same, and the probable cost." The Council on this recommendation resolved to procure the services of an engineer; which appears, in effect, to have been obtained. A few months later, in November, 1884, the Town Council resolved to convene a meeting of the owners and ratepayers of the town on account of "the "expenditure involved in carrying out" this engineer's scheme of water supply. It does not appear what happened in regard of this town's meeting; but in December, 1884, the Council resolved to instruct certain well-sinkers to sink a trial water hole at a place called "Dowles Brook," at a cost not exceeding 11*l.* 10*s.* In March of the year following, viz., 1885, the Council, finding the water from this trial boring unsatisfactory, adjourned consideration of the water question until the engineer previously mentioned should report as to supply from another source. This report was forthcoming in the May following, and had reference to possible supply from the New Red Sandstone on the opposite side of the river from Bewdley. This report, being read, was referred to the General Purposes Committee for consideration and report. What resulted from this proposed consideration does not appear; but in August following the Town Council, who had meanwhile received another letter from the Board, would appear to have appointed another Committee to deal with the water question, inasmuch as a report appears in the Minutes of November 9th, 1885, from a Committee appointed on August 10th to consider as to a public water supply. This Committee reported that the engineer already mentioned considered that an ample supply of pure water could be obtained from the New Red Sandstone on the opposite side of the river (near the village of Wribbenhall); but the Committee added that they thought it their duty to consider a suggestion that had been made for obtaining their water supply from the Kidderminster Water Works. The report of this Committee was referred to the General Purposes Committee. In April 1886 the Town Council discovered that the land they wanted on the Wribbenhall side of the river for the engineer's scheme already mentioned would cost 1,900*l.*; whereupon, this price being regarded as prohibitive, it was resolved that "the whole question of the water supply "be again referred to the General Purposes Committee for further "consideration." In October, 1886, this Committee reported to the Town Council that they had resolved to sink a trial well in Dog Lane, in the town of Bewdley. What occurred during the next year and a half does not appear; but in May, 1888, it is recorded in the Council Minutes that "a memorial was read from a number of the "inhabitants of the borough praying the Council to carry out a "scheme of water supply." This memorial was referred to a sub-committee of the General Purposes Committee. In November, 1888, in reply to a letter from the Board, the Council stated that "a scheme for the water supply has been suggested to the General "Purposes Committee, but the whole question remains for further "consideration." And in the same month the Council resolved that "the further consideration of the question of a public water "supply be referred to the General Purposes Committee." What transpired during the next two years does not appear from the copies of Council Minutes in my possession; but, in March, 1891, on a motion that the scheme to take water from the New Red Sandstone near Wribbenhall be carried out, an amendment was put and carried that "consideration of the question of a water supply be adjourned "*sine die.*". Thus, after more than ten years' consideration, the Town Council apparently thought of abandoning attempt to solve the problem of water supply for Bewdley. However, at a meeting of the Town Council held in the May following, a letter from the County Council of Worcestershire was read in which inquiry was made as to "what steps, if any, the Sanitary Authority have taken, or purpose "taking, with reference to this important matter" of water supply. This letter was referred to the General Purposes Committee. The General Purposes Committee, in their turn, referred the letter to a sub-committee; and the sub-committee advised that the conduit by which water was to be conveyed from Central Wales to Birmingham—a scheme now in course of fulfilment—would pass within some two miles of Bewdley, and that Bewdley should arrange with Birmingham to take its supply from this source. This report was adopted by the

Town Council in August, 1891. An amendment was proposed at the same meeting that, in view of the length of time that would elapse before the Birmingham water would be available, and for other reasons, "the question of a public water supply be again referred to "the General Purposes Committee." But this amendment was lost. In May, 1892, the Town Council passed another resolution in favour of availing themselves of the Birmingham water scheme, and also ordered that the General Purposes Committee "be empowered to "carry out that part of their report which refers to the Butt Town "Meadow Water." The Butt Town Meadow scheme is the one previously alluded to, by which it was proposed to take water from the New Red Sandstone near Wribbenhall; but what the General Purposes Committee reported as regards this scheme, does not appear from my copies of the Town Council Minutes. A year later, in May, 1893, a committee of some sort reported to the Town Council that the "Dog Lane Water," as to which reference will be found to have been made in the minutes of 1886, was not a good potable water, and that its use for drinking could not be recommended. The committee proposed also to spend 25*l*. or 30*l*. in endeavouirng to procure supplies from wells to be sunk "in four places," of which the localities do not appear in my copies of the Town Council Minutes. However, nearly three years later—what occurred in the interim does not appear—notice was given at a Town Council meeting in July, 1896, that at the next meeting of Council a resolution would be moved that the General Purposes Committee should consider and report as to the desirability of utilising the water in Dog Lane for a public supply; and this resolution was unanimously agreed to by the Town Council in November, 1896. And in effect, since then the Board have received from the Bewdley Town Council application for sanction to a loan of 4,000*l*. for purposes of water supply to be provided by this scheme. In the course of their proceedings in reference to this question of water supply, the Town Council have, at one and another time, spent about 400*l*. in the shape of fees to engineers, expenses of well sinking, and chemical analyses of various waters.

Meanwhile, the town of Bewdley is dependent on a water supply which is bad in quality and insufficient in quantity.

In regard of the sewerage of the town, it is worthy of note that at the meeting of the Town Council of Bewdley in November, 1896, when it was resolved to deal with the Dog Lane water scheme before alluded to, it was resolved also to deal "with the sewerage question "now under consideration." It would appear, therefore, that the Town Council are at last awake to the defective conditions of sewerage that prevail in their district, but which hitherto have failed to receive the attention which they obviously called for.

As regards the housing of the poorer classes in Bewdley, the third matter to which particular reference is made by the County Council, it appears clearly from what is set forth by me at an earlier stage of this Report, that in this matter also the complaint preferred by that body is well founded. But I noted, in the course of my inspection, that a good deal was being done, and had in recent months been done, in Bewdley, in the way of causing houses of the poorer sort to be repaired or closed as unfit for habitation. In this connection it is worthy of note that at a meeting of the General Purposes Committee of the Bewdley Town Council, held on October 7th, 1895, it was resolved "that the attention of the Medical Officer of Health be

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On the Western Diffusion of Cholera in 1894-95; by Dr. Bruce Low.

REPORT on the WESTERN DIFFUSION of CHOLERA in 1894 and 1895;

by DR. BRUCE LOW.

In continuation of the reports of 1892 and 1893 on the Western Diffusion of Cholera, the following has been prepared partly from data collected by the late Dr. Barry, and partly from other sources.

CHOLERA IN 1894.

At the end of 1893, cholera still lingered in several parts of Europe, and in January, 1894, cases of the disease were reported in Russia, France, Belgium, and Turkey. In February, cases occurred in Holland. In April, the disease reappeared in Austria, and in May in Germany; in both the latter instances infection was said to have been imported from Russia. The area of cholera prevalence in Europe in 1894 was confined chiefly to European Russia, and to certain districts of Austro-Hungary and Germany immediately adjoining that country. The information as to the amount of cholera that prevailed in Turkey is meagre and indefinite, but epidemics on a considerable scale occurred in some districts in Asia Minor. Sweden and Italy practically escaped in 1894, with the exception of a few cases in each instance brought by steamers from infected ports. The disease never got a foothold in either country during the year. Spain, too, escaped, though one suspicious case was reported from Lucena, in the province of Cordova, but no extension of the disease took place. Portugal, it is said, remained free from the disease during 1894, but a widespread epidemic of diarrhœa, at first regarded as cholera, occurred at Lisbon early in the year. The number of persons attacked was great, but the mortality was practically nil. Bacteriological examination of the bowel discharges of patients showed the presence of an organism resembling that of cholera, but wanting in some of its chief characters. Ultimately, however, it was officially announced at Lisbon that the current malady was not true Asiatic cholera.

It is officially reported that no fewer than 529,049 deaths were due to cholera in India during 1894.

As has already been stated (see XXIV. Annual Report of the Medical Officer to the Local Government Board, 1894-95, p. 260), England, notwithstanding the presence of cholera in numerous Continental ports having trade with this country, practically escaped invasion by the disease during 1894. Only six cases of cholera, or of disease suspected to be cholera, were detected on board vessels arriving in England from foreign ports. The cases were confined to 2 vessels which arrived in the port of London from St. Petersburg. Some 11 cases,

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however, of suspicious illness resembling cholera, occurred in 9 localities throughout England in 1894; but bacteriological examination of the dejecta of the patients in every instance gave negative results.

The following table shows the ascertained number of cholera attacks and deaths in the several countries invaded by the disease in 1894:—

—	Date of first recorded attack of Cholera in 1894.	Total recorded Cholera	
		Attacks.	Deaths.
Russia	* January.	63,980	30,400
Turkey	* "	10,825	4,850
Belgium	* "	1,995	1,049
France	* "	?	254?
Netherlands	February.	539	281
Austria	April.	15,853	8,740
Hungary	August.	435	245
Germany	May.	1,004	490
Italy	July.	64?	20
Sweden	"	30	5

* Continuation of the 1893 epidemic.

Russia.

Cholera, which had been epidemic in Russia in 1892 and 1893, appeared again during 1894. At the end of 1893, cholera cases were reported from several towns and government districts, more especially in the provinces abutting on the frontiers of Germany and Austria. In January, 1894, some eleven government districts yielded cases, some in small numbers, others in larger amount. In Kovno Government, cholera continued to appear throughout the whole year—cases being reported in every month, from January to December. In other government districts the greatest force of the cholera outbreak was felt during the summer months. With the exception of a few places, cholera may be said to have ceased to be active in Russia from the end of January until May. In June, signs of recrudescence of the disease became apparent, and July and August saw the epidemic attain its height. By September, the disease was declining, and in November and December it had almost disappeared from the majority of the governments. In Podolia, however, a considerable number of cholera attacks continued to occur during December, amounting altogether during that month to 561 cases with 233 deaths.

Among the localised outbreaks in the Russian Empire, that which occurred at St. Petersburg is interesting. Cholera had appeared in this city during the previous year, and in January 1894 some 154 cases, with 82 deaths, had been recorded; but subsequent to this no occurrence of cholera in St. Petersburg was reported till near the end of June. In the week ending June 25th, however, 207 attacks and 69 deaths from cholera occurred. In the week following there were 967 cases, of which 346 were fatal. During the following week the outburst reached its height and 1,127 attacks with 578 fatal cases were reported. After this, the disease, though showing a marked decline, continued to occur in St. Petersburg till the 2nd week when only a single case was recorded. The epidemic in St. Petersburg, from beginning to end, lasted 17 weeks, during which time 4,557 persons were attacked, and of these 2,235 died. The following table shows the course of the epidemic from June to October:—

CHOLERA cases and DEATHS in ST. PETERSBURG week by week from JUNE to OCTOBER, 1894.

Cholera.	Week ending																		
	June 25.	July 2.	July 9.	July 16.	July 23.	July 30	August 6.	August 13.	August 20.	August 27.	Sept. 3.	Sept. 10.	Sept. 17.	Sept. 24.	Oct. 1.	Oct. 8.	Oct. 15.	Oct. 22.	Totals.
Cases ..	207	967	1,277	741	278	147	140	231	248	130	81	36	28	21	16	8	1	—	4,557
Deaths. .	69	346	578	451	211	90	67	104	137	80	41	21	18	10	5	5	2	—	2,235

The large majority of the cases occurred in those parts of the city mostly occupied by common labourers, artisans, and mill-hands, and those at first attacked were chiefly persons of this class as well as those employed on barges on the river and canals. The type of the disease was severe, the fatal cases forming 49 per cent. of the attacks. The spread of the malady was attributed to the dirty and reckless habits of the poorer classes, who, in spite of warnings, continued to drink water from the polluted river and canals. Measures were taken by the Municipality to provide hospital accommodation for the sick, and to secure disinfection of soiled clothing, &c., by steam. The canals were flooded so as to remove the impure water in them; the streets were watered with disinfectants. The restaurant keepers, it is stated, were ordered to provide boiled water gratuitously to the poor. Placards were posted, and handbills distributed, urging caution in using food and drink of doubtful purity. The Municipal Medical Staff was largely reinforced, and the city was divided into Medical Districts. Flying Sanitary Columns were organised to visit and deal with infected houses. House to house inspections were organised, and the police visited infected quarters daily, with a view to the immediate discovery of fresh cases.

These measures proved of value in checking the spread of the disease, though it lingered on till October, when it finally disappeared from the city. From St. Petersburg, cholera was imported to Sweden and elsewhere by the steamers plying between St. Petersburg and Swedish ports.

Complete information as to the larger outbreaks in the Russian provinces is not available, but the disease is known to have spread along the large rivers by means of raftsmen and others, as well as by travellers from infected places.

It is of interest to note that close on 35,000 of the cholera attacks, with over 15,000 deaths, occurred in Russian Poland, which adjoins the frontiers of Germany and Austria. That is to say, more than half of all the cholera cases and deaths that were recorded in the

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Russian Empire during 1894, occurred in Russian Poland, the total population of which (in 1891) was 8,900,418, as against 119,032,750 in the Empire.

The appended table gives the names of the governments of Russia attacked by cholera in 1894, together with the populations, and the numbers of cases and deaths as well as the attack and death rates and the "fatality" or case mortality:—

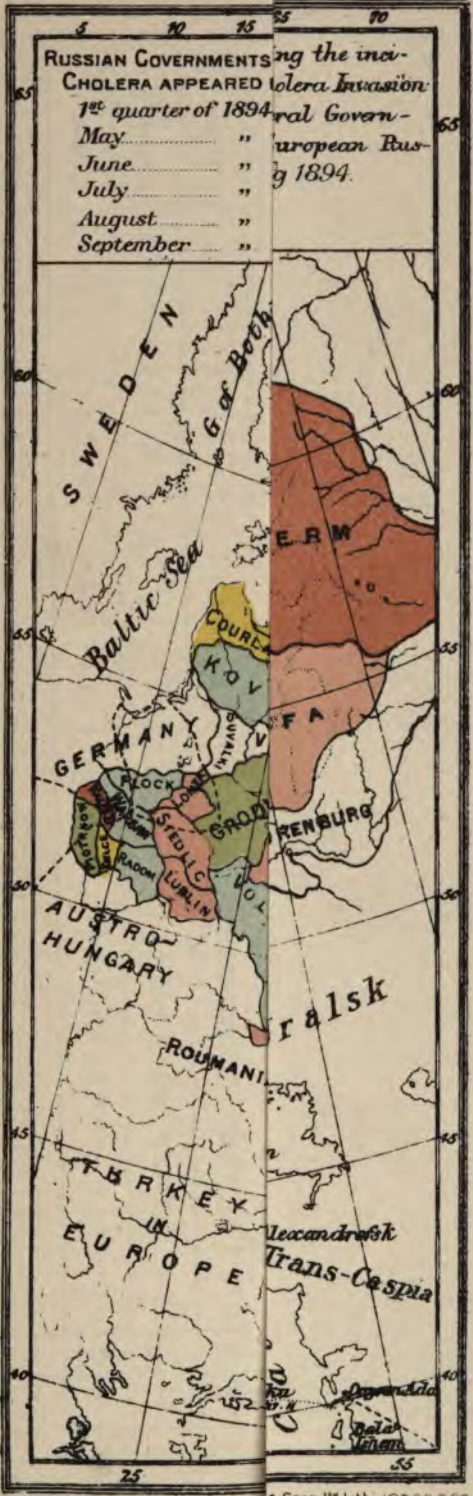
Cholera in Russia in 1894.

Government or City.	Date of occurrence of first recorded Cholera in 1894.	Population, 1891.	Total recorded Cholera.		Rates per 10,000 of the Population.		Percentage of Deaths to Recorded Attacks.
			Attacks.	Deaths.	Attacks.	Deaths.	
1. Kovno	January	1,587,582	1,095	492	6·90	3·10	44·93
2. Plock	„	660,457	2,348	1,222	35·55	18·50	52·04
3. Radom	„	769,229	6,421	3,173	83·47	41·25	49·42
4. Warsaw (City) ..	„	455,852	1,611	654	35·34	14·35	40·60
5. Koursk	„	2,561,031	47	23	0·18	0·09	48·94
6. Volhynia	„	1,511,926	462	193	3·06	1·28	41·77
7. St. Petersburg (City)	„	1,035,439	4,711	2,317	45·50	22·38	49·18
8. St. Petersburg (Govt.)	„	791,720	2,953	1,000	37·30	12·63	34·54
9. Tambof	„	2,900,646	174	94	0·60	0·32	54·02
10. Toula	„	1,515,881	57	13	0·38	0·09	22·80
11. Tchernigof	„	2,244,377	175	71	0·78	0·32	40·57
12. Podolia	March	2,617,253	6,513	2,678	24·88	10·23	41·12
13. Warsaw (Govt.) ..	„	1,043,412	5,206	2,579	49·89	24·72	49·54
14. Piotrokow	May	1,200,197	4,124	2,159	34·36	17·99	52·35
15. Grodno	„	1,483,548	2,694	1,260	18·16	8·49	46·77
16. Kielce	June	737,663	6,799	3,459	92·18	46·89	50·88
17. Courland	„	712,700	616	283	8·64	3·97	45·94
18. Astrakhan	„	878,991	160	109	1·82	1·24	68·13
19. Cronstadt (Town) ..	„	42,603	244	95	57·27	22·30	38·93
20. Mogilef	„	1,415,258	71	31	0·50	0·22	43·66
21. Esthonia	„	404,709	227	124	5·61	3·06	54·63
22. Livonia	„	1,260,653	378	188	3·00	1·49	49·74
23. Olonetz	„	362,131	592	350	16·35	9·67	59·12
24. Pskof	„	1,029,053	94	55	0·91	0·53	58·51
25. Vitebsk	July	1,364,473	605	242	4·43	1·77	40·00
26. Minsk	„	1,794,560	790	331	4·40	1·84	41·90
27. Lomza	„	643,795	497	258	7·72	4·01	51·91
28. Lublin	„	1,059,959	611	289	5·76	2·73	47·30
29. Siedlice	„	752,152	1,494	735	19·86	9·77	49·20
30. Bessarabia	„	1,579,766	2,357	943	14·92	5·97	40·01

Government or City.	Date of occurrence of first recorded Cholera in 1894.	Population 1891.	Total recorded Cholera.		Rates per 10,000 of the Population.		Percentage of Deaths to Recorded Attacks.
			Attacks.	Deaths.	Attacks.	Deaths.	
31. Kostroma .. .	July	1,394,572	450	198	3·23	1·42	44·00
32. Nijni-Novgorod ..	"	1,551,458	2,003	1,134	12·91	7·31	55·86
33. Novgorod	"	1,290,507	1,022	477	7·92	3·77	46·67
34. Tver	"	1,851,150	49	26	0·26	0·14	53·06
35. Oufa	"	2,087,807	7	4	0·03	0·02	57·14
36. Yaroslav	"	1,198,269	734	343	6·13	2·86	46·73
37. Kherson	"	2,223,877	119	70	0·54	0·31	58·82
38. Samara	"	2,657,611	194	102	0·73	0·38	52·58
39. Kalonga	August	1,244,018	386	187	3·10	1·50	48·45
40. Vladimir..	"	2,395,608	129	75	0·54	0·31	58·14
41. Vologda	"	1,282,886	20	10	0·16	0·08	50·00
42. Viatka	"	3,005,795	36	26	0·12	0·09	72·22
43. Ekaterinoslav ..	"	1,653,543	191	102	1·16	0·61	53·40
44. Pensa	"	1,601,458	56	30	0·35	0·19	53·57
45. Perm	"	2,794,922	664	288	2·38	1·03	43·37
46. Riazan	"	1,928,786	1,004	480	5·21	2·49	47·81
47. Saratof	"	2,433,445	453	251	1·86	1·03	55·41
48. Kazan	"	2,195,414	262	159	1·19	0·72	60·69
49. Kief	"	3,139,937	414	194	1·32	0·62	46·86
50. Simbirsk	"	1,638,211	70	43	0·43	0·26	61·43
51. Baku	"	820,318	24	15	0·29	0·18	62·50
52. Kalisch	"	881,798	71	36	0·81	0·41	50·70
53. Poltava	September	2,804,005	23	15	0·08	0·05	65·22
54. Arkhangel	"	354,441	1,021	508	28·81	14·33	49·76
55. Voronèzk .. .	"	2,680,790	139	57	0·52	0·35	41·01
56. Taurida	"	1,141,751	158	94	1·38	0·82	59·49
57. Tiflis	"	800,875	66	30	0·82	0·37	45·45
58. Tobolsk	"	1,411,475	89	26	0·63	0·18	29·21
		86,980,803	63.980	30,400	7·36	3·50	47·51

The following table shows the occurrence of cholera *attacks*, week by week, throughout the invaded governments of the Russian Empire during the year 1894.

The accompanying Map. I. shows the governments of Russia that suffered from cholera during 1894, and the time of the year at which they were invaded.



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Tambof.	Tver.	Toula.	Ufa.	Kherson.	Tchernigof.	Yaroslav.	Baku.	Tiflis.	Tobolsk.	
1	...	2	...	...	18	...	...	...	...	
...	...	...	...	...	2	...	...	...	...	
...	...	...	...	...	6	...	...	...	...	
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...	...	2	...	...	...	...	...	...	...	
...	...	1	...	...	...	...	...	...	...	
...	...	9	...	...	...	...	...	...	...	
...	...	6	...	...	...	...	...	...	...	
...	...	5	...	...	...	...	...	...	...	
...	...	3	...	...	...	...	...	...	...	
...	...	4	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	
...	...	2	...	...	...	...	...	...	...	
...	...	2	...	...	...	5	...	...	...	
...	...	2	...	...	...	5	...	...	...	
4	5	3	1	...	...	9	...	...	...	
...	...	1	5	...	...	22	...	...	...	
6	...	5	1	...	...	31	...	...	...	
1	3	3	...	...	...	128	1	...	...	
21	13	1	...	...	...	154	2	...	20	
3	6	3	...	9	...	108	1	...	26	
32	5	2	...	39	...	74	2	...	16	
32	4	...	...	15	...	53	...	...	12	
17	9	...	...	9	10	28	2	3	15	
6	3	...	...	5	5	43	1	2	...	
18	1	...	...	5	4	27	...	...	...	
19	...	...	...	10	7	8	...	6	...	
6	...	...	...	10	23	5	4	7	...	
5	...	...	...	9	40	2	1	12	...	
...	...	...	...	6	8	8	1	4	...	
...	...	...	...	2	9	15	2	22	...	
3	...	...	...	...	11	6	1	8	...	
...	...	...	...	...	7	2	3	2	...	
...	...	...	...	...	2	...	3	...	...	
...	...	...	...	...	...	1	...	...	...	
...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	3	...	...	...	...	
174	49	57	7	119	175	734	24	66	89	63,980
94	26	13	4	70	71	343	15	30	26	30,400

TURKEY.

In 1892 and in 1893, Turkey had suffered from cholera. Early in 1894, cholera was prevalent in Constantinople, the cases forming part of an epidemic which had begun in the later months of 1893, and which lasted up to April, 1894. During the first three months of 1894, 447 cases of cholera, with 268 deaths, were reported in Constantinople. There was, it is asserted, a special incidence of the disease upon the Greek population living in the capital. It is further stated that many cases were due to the eating of infected mussels, and in consequence the sale of these was prohibited by the authorities. From April to August, Constantinople was practically free from the disease, but in the last named month cases began again to appear, not in large numbers, but more in scattered groups, gradually extending till the disease again assumed epidemic proportions early in 1895.

The early cases of August, 1894, were importations, and appeared to coincide with the arrival of recruits from certain districts in Asia Minor, where cholera was prevalent at the time. Later on, the spread of the disease was associated with pollution of local water supplies. The comma bacillus was found in certain wells and cisterns. In many cases the symptoms were of a mild character, but bacteriological examination of the dejecta proved that the disease was Asiatic cholera. It was noticed that there was a recrudesence of the disease after heavy rainfall. The promiscuous sale of soiled clothing that had been worn by patients who had died from cholera is said, in certain instances, to have spread the disease to the purchasers of the infected articles. Information as to the precise number of cases of cholera and deaths from the disease in Constantinople during the whole of 1894 is not available; the reports from various sources being meagre and untrustworthy.

In other parts of Turkey, and especially in some towns and districts of Asia Minor, cholera was prevalent during parts of 1894. At Sivas, for example, a town of some 40,000 inhabitants, cholera broke out in April, and continued to occur with severity up to the middle of August. It is estimated that about 5,325 cases occurred during the epidemic, with 1,687 deaths. The town is situated 5,000 feet above sea level on the northern borders of the Anti-Taurus Range. The disease was reported to have begun in April, but there is reason to suspect that cases not officially recognised occurred in February and March. The infection in the first instance was brought by travellers from Erzeroum. The spread of the disease was due to specific pollution of a river which furnishes water for the fountains of the houses. On the banks of the river, about a mile above Sivas, is a large village, Tavra, with 1,000 inhabitants. The sewage of this village flows directly into the river. Besides this, Sivas itself was in a very bad sanitary condition. It is said that half of the population were accustomed to defæcate in the streets, and all the house sewage found its way to the river. The measures taken by the authorities were altogether unsatisfactory. The pollution of the water supply was not dealt with, but a sanitary cordon was established round the town, and added additional misery to the situation by interfering with the food supply. The people themselves, with the fatalistic tendencies of the Turks, placed their reliance for escape from the disease upon such measures as pasting on the gate of the house a text taken from the Koran.

At Adrianople (population 70,886) an outbreak of cholera occurred in July and lasted till September; 342 cases, with 204 deaths, being reported. This outbreak was due to infection of the River Tundja, which is used for drinking purposes by the townsfolk. Above the town, on the banks of the Tundja, are barracks from which the sewage flows into the river. The first cases occurred at the barracks, where altogether 177 soldiers were attacked, of whom 74 died. The disease was brought to Adrianople by the troops. Indeed it is believed that the dissemination of cholera in Turkey during 1894, was largely due to infection conveyed by troops moving from place to place.

The measures adopted throughout Turkey to prevent the spread of cholera appear to have been chiefly the institution of a sanitary cordon round the place invaded, and the establishment of lazarets, with quarantine of persons arriving from infected districts. These measures failed to arrest the disease, while they ruined trade and occasioned great inconvenience, as well as suffering, to the population by interfering with food supplies, &c.

It is a noteworthy circumstance that the annual Hedjaz or Mahomedan pilgrimage, passed off in 1894 without any epidemic of cholera among the pilgrims, who had suffered severely during the Hedjaz of 1893, and who also suffered to some extent in 1895.

The official returns are incomplete, but it has been estimated that at least 10,825 cholera cases and 4,850 deaths occurred in Turkey during 1894. It is probable, however, that the actual numbers were considerably larger.

The appended table gives some of the chief centres invaded by cholera in Turkey during 1894.

TURKEY.

Some of the Chief Centres of Cholera in 1894.

—	Date of first recorded Cholera case in 1894.	Population.	Recorded Cholera.		Rates per 10,000 of Population.		Fatality.—Percentage of Deaths to recorded Attacks.
			Attacks.	Deaths.	Attacks.	Deaths.	
Constantinople ...	Jan.	873,565	464	285	5·31	3·26	61·42
Adrianople	July	70,886	342	204	48·25	28·78	59.65
Sivas	April	40,000	5,325	1,687	1331·25	421·75	31·68
Erzeroum	April	60,000	754	403	125·67	67·17	53·45
Kastamouni	May	33,000	?	233	...	70·61	...
Adalia	Nov.	5,000	165	94	330·00	188·00	56·97
Casa Zeila	May	4,000	?	145	...	362·50	...
Iskilib	May	9,000	?	85	...	94·44	...
Konia	May	43,000	503	328	116·98	76·28	65·21
Angora	May	37,000	1,259	723	340·27	195·41	57·43
Mahmuret el Aziz ...	May	35,000	685	322	195·71	92·00	47·01
Sandjack Ismid ...	Aug.	15,000	41	37	27·33	24·67	90·24
Trebizond	May	45,000	50	5	11·11	1·11	10·00
Tokat	May	50,000	67	23	13·40	4·60	34·33
Khodavenkiai Vilayet	July	500,000	?	535	...	10·70	...

BELGIUM.

During 1894, no fewer than 1,995 cases of cholera with 1,049 deaths were reported in Belgium. The earliest cases in the year occurred in Namur, where the disease had been prevalent during December,

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TABLE II.—BELGIUM.

SHOWING the Chief Centres of CHOLERA in BELGIUM in 1894.

Name of Place.	Date of first reported case of Cholera.	Population, 1890.	Total recorded Cholera.		Rates per 10,000 of Population. Cholera.		Percentage of Deaths to Attacks.
			Attacks.	Deaths.	Attacks.	Deaths.	
Province of Namur.							
Namur	1893. Dec. 12	30,087	104	64	34·6	21·3	61·5
Rochefort	1894. September	2,868	15	7	52·3	24·4	46·7
Province of Liége.							
Montegnée	February	6,103	33	16	54·1	26·2	48·5
Sersing	”	33,495	73	57	21·8	17·0	78·1
Tilleur...	”	5,679	130	84	228·9	147·9	64·6
Grâce-Berleur ...	”	3,622	34	16	93·9	44·2	47·1
Saint-Nicolas... ...	”	6,547	24	12	36·7	18·3	50·0
Angleur	”	5,902	31	10	52·5	16·9	32·3
Jemeppe	”	8,400	119	88	141·7	104·8	74·0
Liége	”	147,660	524	229	35·5	15·5	43·7
Ongrée	”	10,241	43	24	42·0	23·4	55·8
Hollogne-aux-Pierres	July	4,619	72	29	155·9	62·8	40·3
Jupille	”	4,561	36	17	78·9	37·3	47·2
Herstal	”	13,877	81	48	58·4	34·6	59·3
Flémalle-Grande ...	”	4,602	41	25	89·1	54·3	61·0
Wandre	”	4,373	37	28	84·6	64·0	75·7
Olne	”	3,234	16	9	49·5	27·8	56·3
Flémalle-Haute ...	”	3,097	23	8	74·3	25·8	34·8
Ans	”	6,875	28	8	40·7	11·6	28·6
Mons	August	2,628	21	6	79·9	22·8	28·6
Chaudfontaine ...	September	1,752	20	9	114·2	51·4	45·0
Province of Limbourg.							
Tongres	June	8,871	14	5	15·8	5·6	35·7
Province of Anvers.							
Boom	August	13,892	19	14	13·7	10·1	73·7
Willebrock	”	8,164	8	8	9·8	9·8	100·0
Province of Flandre Orientale.							
Steendorp	August	2,932	7	5	23·9	17·1	71·4
Province of Luxembourg.							
Marche	September	3,471	13	7	37·5	20·2	53·9

FRANCE.

Cholera, which was prevalent during 1893, in the department of Finisterre continued to show itself in a fatal form during the early months of 1894. Between January and May, some 225 cholera cases, with 144 deaths,* were reported. The disease was largely confined to the rural districts. In the adjoining department of Morbihan,

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* The British Consular report gives the number of cholera deaths in Finisterre as 140.

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cholera is stated to have been prevalent in the early months of 1894, the cases being confined, as in Finisterre, to the country districts. No official records are available showing the number of attacks and deaths in Morbihan during the year. Deaths from choleraic diarrhœa were certified in a number of communes in Morbihan in March and April.

Scattered cases of suspicious illness of a choleraic character were reported during the summer months from other departments, such as Meuse, Meurthe et Moselle, Vaucluse, Seine et Oise, and Ardennes. The cases in Meuse, and in Meurthe et Moselle occurred in July, and were due, it was stated, to infection imported from Liége (Belgium), where cholera at the time existed in an epidemic form. During the summer and autumn months, outbreaks of a similar kind, some of them described as "dysentery," occurred in various parts of France. Such outbreaks were reported from Finisterre and Morbihan, where earlier in the year cholera had been present. Among some of these suspicious outbreaks may be mentioned for example one at Herpongant, in Morbihan, a village of 1,000 inhabitants, where 15 cases, with 5 deaths occurred in August. From Herpongant, the infection was carried to neighbouring villages, where fatal cases also followed. At Rondouillac, in Morbihan, a village of 1,248 inhabitants, an outbreak of "dysentery" occurred, attributed to the pollution of the water supply, some 25 cases with 5 deaths being recorded. In the department of Finisterre similar outbreaks of "dysentery" occurred. For example, at Carhaix (population, 2,500), some 100 persons were attacked, and of these 35 died. This outbreak was attributed to the pollution of the water supply, and it was stated also that the disease was spread by "secondary infection." At Scaër (population, 5,686), 23 cases and 11 deaths occurred, the infection having been brought from Carhaix. Other neighbouring communes suffered in the same way.

The official returns published in the "Statistique Sanitaire des Villes de France et d'Algeria" for the year 1894, give only 5 deaths from cholera in the 680 towns included in the summary. But separate returns of epidemic maladies treated in the Garrisons, special institutions, and civil hospitals, yield some 105 other cholera deaths. This list does not include the deaths among the rural population in Finisterre and Morbihan. But taking the number of cholera deaths just mentioned above as given in the official summary, amounting to 110, and adding to these the 144 deaths in Finisterre during the early part of the year, the total cholera deaths recorded in France during 1894, amounted to 254, without including the fatal suspected cases that occurred in Finisterre and Morbihan and elsewhere in the summer and autumn months. The departments in which cholera deaths were officially recorded, included Bouches du Rhône, Finisterre, Gard, Manche, Nord, Haut Rhin, Seine, Seine Inferieure, and Calvados.

With regard to cholera in the large towns—in Paris 46 cholera patients were admitted to the hospitals during the year, and of these 18 died. A single case was admitted in February; 3 in May; 2 in June; 12 in July; 20 in August; 7 in September; and 1 in October. In addition to the 18 deaths from cholera in the hospitals, there occurred in Paris, during the year, 23 deaths from "maladies cholériformes." An examination of the official returns of deaths from diarrhœa in Paris during 1894 shows a rise in July and

August; in September the number was declining, and in November it fell considerably. But there is no evidence of any widespread epidemic of diarrhœal disease having occurred in Paris during the summer and autumn months of 1894. The Paris epidemic of cholera was therefore of small dimensions, and did not affect any large number of persons.

At Marseilles, the "Statistique Sanitaire" already quoted gives 3 deaths from cholera as having occurred in the city outside the hospitals, and 86 as having taken place in the Garrison and the civil hospitals, a total of 89. But in addition to this there were a large number of deaths from "maladies cholériformes." In June these deaths numbered 17, in July, 149, in August, 250, in September, 246, and in October, 11.

The following table has been compiled from the figures given in the monthly issues of the "Statistique Sanitaire," and does not include the Garrison and hospital cases, which are apparently excluded from the monthly summaries.

Table showing separately deaths from cholera, "maladies cholériformes," and diarrhœa, month by month in Marseilles, during 1894, distinguishing infantile deaths from the others.

Marseilles, population (1891), 406,919.

—	Cholera.			Maladies Cholériformes.			Diarrhœa. Gastro-entérite.		
	Infants.	Others.	Total.	Infants.	Others.	Total.	Infants.	Others.	Total.
January ...	—	—	—	—	—	—	29	18	47
February ...	—	—	—	—	—	—	27	16	43
March	—	—	—	—	—	—	32	15	47
April	—	—	—	—	—	—	30	23	53
May	—	—	—	—	1	1	60	16	76
June	—	—	—	2	15	17	82	34	116
July	—	—	—	6	143	149	112	96	208
August ...	—	3	3	3	247	250	55	72	127
September ...	—	—	—	4	242	246	54	65	119
October ...	—	—	—	—	11	11	34	40	74
November ...	—	—	—	—	1	1	25	24	49
December ...	—	—	—	—	—	—	24	22	46
Total		3	3	15	660	675	564	441	1005

From the above table it is evident that coincident with the occurrence of three cholera deaths in Marseilles there was an epidemic of "maladies cholériformés," causing the deaths of a comparatively large number of adults. How far these deaths may have been due to Asiatic cholera it is impossible here to say.

From Marseilles, cholera infection was carried by travellers to Bordeaux, where, however, only one death was reported, to Genoa, and to Naples (see Cholera in Italy, page 143). From newspaper correspondents' statements, it would appear that some residents in Marseilles believed that cholera had been more prevalent than was admitted by the city authorities. It was asserted that at least 150 deaths from cholera occurred in Marseilles during August and September. At the end of the year cholera had apparently disappeared from France.

APP. A. No. 11.

On the Western Diffusion of Cholera in 1894-95; by Dr. Bruce Low.

THE NETHERLANDS.

During 1894 no less than 48 localities in the Netherlands were known to have become infected by cholera. The province of Limburg was invaded in February, and Zuidholland in March. These developments were probably due to remains of the 1893 epidemic. But the main outbreak was from July onwards. In July the 4 provinces of Gelderland, Noordholland, Groningen, and Drenthe were attacked. In August, 4 other provinces were invaded, viz.: Noordbrabant, Zeeland, Utrecht, and Friesland, while Overijssel was not known to be infected till November.

Maestricht, the capital of the province of Limburg, was reported to be attacked by cholera on July 31st, the infection having been brought, it is asserted, from Liége, where cholera had begun to occur in May. In July cases also occurred at the Hague and Rotterdam. In August, single cases were reported from Amsterdam and Dordrecht, and during this month a large number of communes were invaded. Some cases occurred on board foreign and coasting vessels arriving in Dutch ports. No definite information as to the precise number of cholera cases occurring in the Netherlands during 1894 has been obtainable. But from unofficial sources it is calculated that the total number of attacks was about 539. The official death returns, however, are available, and from these the appended table has been drawn out. The total number of fatal cholera cases in 1894 amounted to 281; this was in excess of the deaths from the same cause in 1893, when the total number was 263.

TABLE I.—NETHERLANDS.

Statistics of Cholera in the Several Provinces of the Netherlands during 1894.

Provinces.	Month in which Cases of Cholera were first recorded during 1894.	Population estimated to January 1894.	Deaths from Cholera.	
			Number.	Rate per 10,000 population.
Limburg	February	259,593	59 (13)	2·27
Zuidholland	March	987,342	76 (13)	0·77
Gelderland	July	520,210	7 (5)	0·13
Noordholland	July	860,742	99 (9)	1·15
Groningen	July	277,282	1 (1)	0·04
Drenthe	July	134,027	1 (1)	0·07
Noordbrabant	August	516,670	13 (7)	0·25
Zeeland	August	202,096	2 (1)	0·10
Utrecht	August	226,847	20 (1)	0·88
Friesland	August	336,442	2 (1)	0·06
Overijssel	November	300,493	1 (1)	0·03
NETHERLANDS	...	4,621,744	281 (53)*	0·61

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* The figures in brackets were certified as Cholera Nostras.

APP. A. No. 11.

On the Western Diffusion of Cholera in 1894–95; by Dr. Bruce Low.

TABLE II.—NETHERLANDS.

Chief Centres of Cholera in the Netherlands during 1894.

Place.	Approximate date of infection by Cholera.	Population estimated to January 1894.	Cholera Deaths.	
			Deaths.	Cholera Death Rate per 10,000 population.
	PROVINCE OF NOORDBRABANT.			
Tilbury	September	35,586	4	1·12
Whole Province	August	524,043	13	0·25
	PROVINCE OF GELDERLAND.			
Province	January	528,276	7	0·13
	PROVINCE OF ZUIDHOLLAND.			
Dordrecht	August	34,847	5	1·43
'S. Gravenhage	October	174,790	1	0·06
Leiden	August	44,340	1	0·23
Rotterdam	July	228,597	12	0·52
Whole Province	March	1,021,436	76	0·74
	PROVINCE OF NOORDHOLLAND.			
Amsterdam	July	446,657	38	0·85
Haarlem	August	56,803	8	1·41
Helder	July	24,395	1	0·41
Nieusver Amstel	August	30,265	3	0·99
Whole Province	July	895,080	99	1·11
	PROVINCE OF ZEELAND.			
Province	August	204,561	2	0·10
	PROVINCE OF UTRECHT.			
Utrecht	August	91,070	5	0·55
Whole Province	August	232,316	20	0·86
	PROVINCE OF FREISLAND.			
Province	August	336,204	2	0·06
	PROVINCE OF OVERIJSSEL.			
Province	November	306,524	1	0·03
	PROVINCE OF GRONINGEN.			
Province	July	281,970	1	0·04
	PROVINCE OF DRENTHE.			
Province	July	137,456	1	0·07
	PROVINCE OF LIMBURG.			
Maestricht	July	32,945	44	13·36
Whole Province	February	265,046	59	2·23

AUSTRIA.

No official report, so far as can be learned, has been issued by the Austrian Government upon the cholera outbreak of 1894. The following brief summary of events, and the statistics given below, have been taken from the weekly reports given in the "Oesterreichische Sanitätswesen," the organ of the Imperial Health Office.

Cholera, which had appeared in Austria in 1892 and in 1893, assumed grave epidemic proportions during the summer and autumn months of 1894. With the exception of a few cases in the provinces of Moravia and Silesia, the whole force of the epidemic fell upon Galicia and Bukowina.

Galicia.—Certain localities in Galicia that had suffered during 1893, yielded cholera cases up to December. After that no further cases occurred till April, 1894, when in the two political departments of Borszczow and Husiatyn fresh cases occurred, due, it was asserted, to infection brought from the neighbouring government district of Podolia in Russia. The localities in Eastern Galicia first invaded in 1894 by cholera are situated close to the Russian frontier, and lie in the basins of the rivers Dniester and Pruth, the same district that formed the centre of the outbreak of 1893. No serious spread of the disease was observed till July. By the end of that month, 16 out of the 74 political departments of Galicia had become affected. The town of Zaleszczki was one instance where the conditions proved favourable to the spread of the disease—5 per cent. of the population being attacked. Ultimately, no less than 61 of the 74 departments of Galicia were invaded, and 754 separate communes suffered, yielding from April 7th to December 31st the enormous number of 14,990 cholera cases, with 8,236 deaths. In April, 2 departments were invaded; none in May; 3 in June; 12 in July; 18 in August; 14 in September; 4 in October; 5 in November; and 3 in December. Owing to the prevalence of cholera the military manoeuvres appointed to be held in the province of Galicia during August were countermanded. The spread of the disease was, without doubt, favoured by the concealment of the occurrence of cases in certain districts; even cholera deaths were in some places concealed by means of false certificates of the cause of death. Cholera riots occurred in several places among the peasantry, and patients were forcibly removed by the mob from hospitals in which they had been isolated. In one instance the house of the Sanitary Officer was set on fire, and the military had to be called in to restore order.

Bukowina.—In this province the first invasion of cholera in 1894 occurred in June; the infection, it is alleged, was brought across the frontier from Russia. Ultimately 9 political departments and 66 communes were affected, yielding from June to November 863 cases with 504 deaths. In December, 1894, the province was declared free from cholera infection. In dealing with the outbreak, difficulty was experienced by the authorities, owing to the ignorance of the populace. It is reported that at Czernowitz, the capital of the province, an extremely bitter feeling prevailed against the medical profession among the lower classes, who firmly cherished the ignorant belief that the physicians poisoned the cholera patients in hospital. For this reason fresh cholera attacks were often concealed, and the disease allowed to gain a further footing in the place. The River Sereth, which flows through the centre of the Bukowina province, was found by bacteriological examination to contain cholera bacilli during the autumn of 1894.

The measures taken to stay the spread of the disease in the affected Austrian provinces were similar to those taken with success during 1893. These included among other things the appointment of special medical men to attend cases and to supervise districts; notification, and isolation, as far as possible, of the sufferers in special hospitals; bacteriological examination of dejections of suspected cases; the regulation of the river traffic; the promotion of measures for domestic cleanliness; the medical examination of all persons crossing the frontier; the regulation of the traffic between infected and non-infected districts; the disinfection of soiled clothing, &c.; the closure of schools in infected localities, the stoppage of all fairs, festivals, pilgrimages, and other gatherings. Also the speedy burial of the dead, and house to house visitations to discover concealed cases.

The appended tables show the incidence of cholera upon the invaded departments in Galicia and Bukowina, together with the numbers, and rates of, attacks and deaths from the disease, and the case mortality during 1894.

TABLE I.—AUSTRIA.

CHOLERA in the Province of GALICIA during 1894.

Province.	Department. (Politischer Bezirk.)	Date of first recorded case of Cholera.	Population, 1890.	Number of Communes invaded (Gemeinde).	Number of recorded Cholera.		Rates per 10,000 of population. Cholera.		Deaths per cent. of recorded attacks.
					Attacks.	Deaths.	Attacks.	Deaths.	
GALICIA.	Borszczów	Apr.	106,282	53	1,280	700	120·43	65·86	54·69
	Husiatyn	”	89,369	27	728	377	81·46	42·18	51·79
	Zaleszczyki	Jun.	72,028	43	1,264	749	175·49	103·99	59·26
	Nisco	”	61,200	10	41	27	6·70	4·41	65·85
	Tarnobrzeg	”	68,778	13	120	70	17·45	10·18	58·33
	Buczacz	July	112,688	62	2,220	1,040	197·00	92·29	46·85
	Czortków	”	64,626	18	669	357	108·16	55·24	53·36
	Skalat	”	84,027	20	432	226	51·41	26·90	52·31
	Stanislau	”	103,803	35	644	340	62·04	32·75	52·80
	Tarnopol	”	118,260	6	41	21	3·47	1·78	51·22
	Trembowla	”	71,537	20	181	109	25·30	15·24	60·22
	Kolomea	”	129,865	25	388	225	29·88	17·33	57·99
	Krakaw (District) ..	”	72,472	34	335	198	46·22	27·32	59·10
	Krakaw (Stadt) ..	”	75,514	1	137	94	18·14	12·45	68·61
	Tlumacz	”	89,053	25	1,001	622	112·41	67·82	62·14
	Horodenka	”	85,840	26	1,090	620	126·98	72·23	56·88
	Kolbuszow	”	70,312	5	17	12	2·42	1·71	70·59
	Nadworna	Aug.	71,322	12	57	36	7·99	5·05	63·16
	Bohorodczany ..	”	56,064	15	476	271	84·90	48·34	56·93
	Kosow	”	77,650	18	298	156	38·38	20·09	52·35
	Podhajce	”	79,056	25	419	214	53·00	27·07	51·07
	Biala	”	91,754	3	7	4	0·76	0·44	57·14
	Bochnia	”	99,187	9	29	19	2·92	1·92	65·52
	Brzesko	”	90,688	3	11	6	1·21	0·66	54·55
	Chrzanow	”	77,281	4	60	23	7·76	2·98	38·33
	Dabrowa	”	62,892	4	20	10	3·18	1·59	50·00
	Gorlice	”	78,986	1	26	15	3·29	1·90	57·69
	Grybów	”	48,610	1	7	3	1·44	0·62	42·86
	Kalusz	”	77,961	11	112	56	14·37	7·18	50·00
	Mielec	”	71,104	6	13	9	1·83	1·27	69·23
	Saybusch	”	97,444	2	38	15	3·90	1·54	39·47
	Sniatyn	”	75,764	17	124	78	16·37	10·30	62·90
	Tarnow	”	99,806	9	145	82	14·53	8·22	56·55
	Wieliczka	”	102,340	19	175	112	17·10	10·94	64·00
	Wadowice	”	104,722	12	37	18	3·53	1·72	48·65
	Brzezany	Sept.	86,825	15	283	148	32·59	17·05	52·30
	Lemberg (District)..	”	108,686	4	129	91	11·87	8·37	70·54
	Lemberg (Stadt) ..	”	127,638	1	90	75	7·05	5·88	83·33
	Zloczow	”	149,068	27	368	194	24·69	13·01	52·72
	Bobrka	”	68,627	21	314	189	45·75	27·54	60·19
	Rohatyn	”	95,622	39	527	294	55·11	30·75	55·79
	Przemyslany ..	”	67,781	6	43	25	6·34	3·69	58·14
	Zydaczów	”	65,009	4	107	55	16·46	8·46	51·40
	Kamionka Strumilowa.	”	97,409	12	272	136	27·92	13·96	50·00

Province.	Department. (Politischer Bezirk.)	Date of first recorded case of Cholera.	Population, 1890.	Number of Communes invaded. (Gemeinde).	Number of recorded Cholera.		Rates per 10,000 of population. Cholera.		Deaths per cent. of recorded attacks.
					Attacks.	Deaths.	Attacks.	Deaths.	
GALICIA.	Limanowa	Sept.	72,999	1	1	—	0·14	—	—
	Mosciska	„	71,671	1	2	1	0·28	0·14	50·00
	Myslenice	„	84,900	4	14	9	1·65	1·06	64·29
	Turka	„	62,574	1	1	1	0·16	0·16	100·00
	Brzozów	„	72,883	1	1	1	0·14	0·14	100·00
	Jaworów	Oct.	68,909	4	11	7	1·60	1·02	63·64
	Brody	„	129,337	5	128	58	9·90	4·48	45·31
	Nowy Targ (Newmarkt).	„	74,810	3	11	2	1·47	0·27	18·18
	Stryi	„	93,436	2	24	15	2·57	1·61	62·50
	Grodek	Nov.	64,289	2	15	14	2·33	2·18	93·33
	Rawa Ruska.. ..	„	93,552	1	1	—	0·11	—	—
	Sokal	„	89,539	1	1	—	0·11	—	—
	Jaslo	„	102,215	1	3	1	0·29	0·10	33·33
	Zolkiew	„	80,452	1	2	2	0·25	0·25	100·00
	Dolina	„	90,928	1	?	1	—	0·11	—
	Krosno	„	76,831	1	?	2	—	0·26	—
	Lisko	„	84,884	1	?	1	—	0·12	—
			5,219,159	754	14,990	8,236	28·72	15·78	54·94

TABLE II.—AUSTRIA.

CHOLERA during 1894 in the Province of BUKOWINA, showing Departments attacked.

Province.	Department. (Politischer Bezirk.)	Date of first recorded case of Cholera.	Population, 1890.	Communes invaded by Cholera.	Recorded number of Cholera.		Rates per 10,000 of population. Cholera.		Deaths per cent. of recorded attacks.
					Attacks.	Deaths.	Attacks.	Deaths.	
BUKOWINA.	Czernowitz (Stadt) ..	July	54,040	1	43	27	7·96	5·00	62·79
	Czernowitz (District) ..	Aug.	90,704	7	91	58	10·03	6·39	63·74
	Gurahumora	„	26,605	8	156	75	58·64	28·19	48·08
	Kimpolung	Sept.	45,832	2	2	2	0·44	0·44	100·00
	Kotzman	Jun.	89,975	26	265	154	29·45	17·12	58·11
	Radantz	Sept.	93,639	2	19	14	2·03	1·50	73·68
	Storozynetz	Aug.	70,532	6	53	36	7·51	5·10	67·92
	Suczawa	July	56,530	3	27	18	4·78	3·18	66·67
	Wiznitz	„	64,626	11	207	120	32·03	18·57	57·97
			592,483	66	863	504	14·57	8·51	58·40

HUNGARY.

Cholera, which had invaded Hungary in 1893, persisted in the kingdom towards the end of the year. Among other parts of the country infected was the county of Máramaros, where cases occurred as late as November, 1893. But after this the disease seems to have disappeared, for no cases were reported for a period of 8 months. Early in August 1894, however, cholera cases began to be reported at Körösmező, and, later on, at Trebusa, in the County of Máramaros. Both of these places are situated in the north-eastern corner of Hungary, and close to the frontier of Galicia, where at this time cholera was epidemic. It is probable that infection was imported into Hungary from Galicia, but on the other hand the possibility of a recrudescence of infection left from the epidemic of 1893 cannot be altogether excluded. After this, in September, October, and November, other localities were attacked in the county of Máramaros; and scattered cases were also reported from the counties of Ugocsa, Bereg, Szabolcs and Borsod during October and November, after which time the disease again seemed to disappear entirely. Altogether there occurred, during 1894, in Hungary, 435 cases of cholera, of which 245 or 56 per cent., proved fatal.

With regard to the measures taken by the authorities to prevent the spread of the infection, steps were taken to provide hospital accommodation for the cholera patients, with means for disinfecting clothing, &c. Numerous small buildings were erected on the frontiers, where suspicious cases could be detained in quarantine; and detachments of the gendarmerie were told off to prevent unauthorized persons from crossing the borders into Hungary.

Some difficulty was experienced by the authorities in carrying out sanitary measures in the infected localities. For instance, at the town of Huszt (population 7,460) serious rioting took place in October, owing to the objection of the inhabitants to having their relatives, who had died of cholera, buried in a separate cemetery. Ultimately the military had to be called in, and order was not restored before the soldiers had fired upon the mob.

In the appended table will be found the particulars of places in Hungary invaded by cholera, with other statistical information.

TABLE I.—HUNGARY.

CHOLERA in HUNGARY during 1894.

County.	Town or Village.	Date of first recorded Case of Cholera, 1894.	Population, 1890.	Total recorded Cholera		Cholera Death Rate per 10,000 Population.
				Attacks.	Deaths.	
Máramaros	Körösmezö ...	Aug. 6	7,616	126	68	89·3
	Trebusa ...	„ 31	1,887	24	16	84·7
	Rahó	Sept. 9	5,667	28	12	21·2
	Borkút	„ 9	836	72	33	394·7
	Karácsony falva	„ 12	1,807	2	1	[5·5]
	N.-Bocskó ...	„ 13	4,541	32	20	44·0
	Sziget	„ 20	14,762	17	12	8·1
	K.-Lonka ...	Oct. 2	1,826	4	2	11·0
	Bustyaháza falu	„ 7	1,611	2	2	12·4
	Bustyaháza handal.	„ 15	655	2	2	30·5
	Huszt	„ 18	7,460	53	30	40·2
	Ferenczvölgy ...	„ 20	290	1	...	...
	H.-Monostov ...	„ 26	1,051	11	8	76·1
	Száldobos ...	Nov. 3	1,071	1	1	[9·3]
	Szeklencze ...	„ 5	1,894	6	5	26·4
	Berezna ...	„ 9	174	3	2	114·9
	Visk	„ 8	4,059	13	6	14·8
	Falu-Szlatina ...	„ 22	2,830	10	5	17·7
	Közép-Apta ...	„ 24	2,738	9	5	18·3
			62,775	416	230	36·6

County.	Town or Village.	Date of first recorded Case of Cholera, 1894.	Population, 1890.	Total recorded Cholera.		Cholera Death Rate per 10,000 Population.
				Attacks.	Deaths.	
Ugocsa ...	Tisza-Ujlak ...	Oct. 3	2,845	4	4	14·1
	Fancsiko ...	„ 27	810	1	...	...
	Tisza-Kirva ...	Nov. 15	468	1	1	[21·4]
			4,123	6	5	12·1
Bereg ...	Jánd	Oct. 6	860	3	2	23·3
	T.-Vid	Nov. 1	556	1	1	[18·0]
	M.-Vári... ...	„ 1	2,340	1	...	...
	Badaló	„ 5	929	1	1	[10·8]
			2,585	6	4	15·5
	KOMÁROM ...	Oct. 15	13,076	2	1	[0·8]
Szabolcs ...	Mogyorós ...	Oct. 26	704	1	1	[14·2]
	Rakamaz ...	Nov. 21	3,473	1	1	[2·9]
			4,177	2	2	4·8
Borsod ...	Mezökövesd ...	Nov. 4	12,700	3	3	2·4
		Totals	99,436	435	245	...

GERMANY.

Almost all the cholera outbreaks in Germany, during 1894, appear to have been the result of importation of infection from other countries. At the end of 1893, cases had occurred in Oppeln, imported from Russia, but by January 20th, 1894, the disease had ceased to appear. It was not till May that the re-appearance of Asiatic cholera in Germany commenced. During this month some cases occurred at Myslowitz, in Upper Silesia, near the Russo-German frontier, the infection having been brought from the Russian district of Bendzin. The local authorities stated that the waters of the frontier river Przemsza, a tributary of the Vistula, had become infected by the cholera poison. Shortly afterwards cases began to occur among the river raftsmen and bargemen on the Vistula. The waters of the Vistula were then declared infected, and the bathing establishments upon it were closed. The cholera bacillus was found in the river water above Dantzic, where cases were now beginning to occur. By the middle of July, at least 6 German towns and villages on the banks of the Vistula had become infected. It was found that notwithstanding the prohibition by the authorities many bargemen and raftsmen continued to drink the

o. 11. Vent- usion ra in , by ce Low.

polluted water of the Vistula. Up to the 3rd week in July it wa officially declared that all the cases of cholera that had hitherto occurred in 1894 in East Prussia had, with one exception, been found among those who drank the river water, or who lived on or near th river. The exception just mentioned was that of a woman who arrive on July 18th in Berlin, from St. Petersburg, and was taken ill wit cholera within half an hour of her arrival. The disease ultimate spread along the numerous navigable waterways of East Prussia, a extended to districts having communication with them. In th western parts of Germany, the number of places invaded was com paratively small, being only 9; and of these places, 6 were o or near the River Rhine. In one of these outbreaks where the numb of persons attacked amounted to 12, ten of them were sailors fr Holland, where at the time cholera was appearing. In other instan infection was imported from Belgium, where a considerable number cases had already occurred. One case was proved to be due to attempt at Emmerich to commit suicide by drowning in the Rhine, th waters of which were known at the time to be polluted by chole dejections.

The total recorded cholera cases in the German Empire during 1894 amounted to 1,004, of which 490, or 48·8 per cent., proved fatal. The cases were distributed over 157 separate places. The appended Table I. gives the names of the districts or towns infected by cholera in 1894, the number of attacks and deaths, and other statistical information.

The further details of the localities attacked by cholera in the German Empire during 1894 are given in the Table II.

The appended Map II. shows the position of each of the 157 places invaded by cholera in 1894 and their relations to the Russian an Austrian frontiers, as well as to the large rivers and waterways Germany.

The precautions taken by the German Government comprised t closing of the frontiers against the passage of travellers from Russ except at certain specified points, where medical examination of passengers was made. Navigation of rivers and canals on the border was prohibited, except by day; and raftsmen when landed were kept under supervision. All gatherings of civilians near the infected localities were forbidden ; military and naval manœuvres near Dantzic and other infected places were countermanded. Means were provided for isolating infected persons; infected clothing was burned; members of infected families were carefully watched, and the invaded dwellings were cleansed and disinfected. All bathing establishments on the infected waterways were closed. The arrangements were carried out in a very satisfactory manner, and to these precautions must be attributed to the fact that, notwithstanding the frequent re-importations of the disease from the severely affected districts of Russian Poland, cholera did not succeed in attaining epidemic proportions in 1894 on a larger scale in the German Empire.

TABLE II.

CHOLERA in the GERMAN EMPIRE from May 23rd to December 31st, 1894.

County (Kreis) or County Town (Stadt Kreis).	Place.	Date of first recorded case of Cholera, 1894.	Population, 1890.	Total recorded Cholera.		Cholera Death-rate per 10,000 population.
				Attacks.	Deaths.	
PRUSSIA.						
GOVERNMENT DISTRICT OF OPPELN.						
Kattowitz ..	Myslowitz .. .	May 23	9,990	24	15	15·02
	Rosdzin	Aug. 15	5,520	5	4	7·25
	Brzenskowitz ..	„ 22	1,895	1	..	..
	Siemianowitz ..	„ 22	6,990	70	39	55·79
	Hohenlohehütte ..	„ 25	2,627	13	5	19·03
	Klein-Dombrowka	„ 27	4,866	11	5	10·28
	Josefsdorf-Domb ..	„ 28	5,778	17	7	12·11
	Michalkowitz ..	„ 31	3,105	6	3	9·66
	Bogutschütz ..	Sept. 1	9,250	12	7	7·57
	Laurahütte	„ 1	11,371	88	60	52·77
	Baingow	„ 6	610	1	1	16·39
	Bittkow	„ 7	1,665	21	14	84·08
	Georgshütte.. ..	„ 9	1,092	1	..	..
	Chorzow	„ 10	5,661	1	..	..
	Kattowitz	„ 12	18,395	3	2	1·09
	Przelaika	„ 14	730	1	1	13·70
	Brzezinka	Oct. 29	3,078	2	..	..
Pless	Dzietzkowitz ..	Aug. 29	868	1	1	11·52
	Grosz-Chelm ..	Oct. 7	1,885	1	1	5·31
	Petrowitz	„ 12	1,534	1	..	..
	Timmendorf ..	„ 14	897	2	2	22·30
	Berun	„ 21	1,964	2	2	10·18
	Imielin	„ 30	2,299	1	1	4·35
Beuthen.. ..	Königshütte ..	Sept. 2	40,182	8	4	1·00
	Lipine..	„ 21	14,390	1	..	..
Grosz-Strelitz	Adamowitz	„ 5	878	11	10	113·90
Zabrze	Zaborze	„ 6	16,779	2	2	1·19
Rosenberg	Wyssoka	„ 12	651	1	1	15·36
Oppeln	Slawitz	„ 15	424	4	2	47·17
	Oppeln	„ 17	21,255	2	..	..
Neustadt in Oberschl.	Ober-Glogau ..	Oct. 20	5,577	1	1	1·79
GOVERNMENT DISTRICT OF MARIENWERDER.						
Thorn	Schilno	May 31	415	13	7	168·67
	Thorn	July 10	27,018	22	11	4·07
	On a boat at Thorn	„ 12	..	4	4	..
	In workmen's huts at Gurske.	Aug. 7	..	1	1	..
	Neubruch	„ 12	380	2	2	52·63
	Mocker	„ 23	10,048	4	2	1·99
Marienwerder..	Grosz-Grünhof ..	June 6	90	5	2	222·22
	Kurzebrack	July 13	681	5	2	29·34
Rosenberg in W. ..	Deutsch-Eylau ..	June 25	5,700	2	..	..
Graudenz ..	Grosz-Wolz	July 11	1,016	4	2	19·69
	Graudenz	„ 17	20,393	3	2	0·98
Schwetz	Christfelde	„ 11	205	2	1	48·78
Kulm	On the River near Kulm.	„ 14	..	1	1	..
	Scharnese	„ 21	734	1	1	13·62
Briesen	Collub..	Aug. 3	2,738	9	5	18·26
	Wimsdorf	Sept. 2	480	1	1	20·83
Löbau in W.	Rosenthal	Aug. 20	1,300	1	1	7·69
GOVERNMENT DISTRICT OF BROMBERG.						
Inowrazlaw	Steinfurth	June 1	135	1	1	74·07
Bromberg ..	Fordon	July 11	2,348	3	2	8·52
	Josephinen	Aug. 3	510	6	6	117·65
	Lochowice	„ 13	352	5	4	113·64
	Schloszhauland ..	„ 28	729	1	1	13·72
	Gumnowitz	Oct. 8	127	1	1	78·74

ty (Kreis) or nty Town adt Kreis).	Place.	Date of first recorded case of Cholera, 1894.	Population, 1890.	Total recorded Cholera.		Cholera Death-rate per 10,000 population.
				Attacks.	Deaths.	
PRUSSIA—*cont.*						
GOVERNMENT DISTRICT OF BROMBERG—*cont.*						
.. ..	Nakel	Aug. 6	6,766	73	31	45·82
	On the river near Netzdamm.	„ 9	..	1	1	..
	Hoffmannsdorf ..	„ 12	246	1	1	40·65
	Amflusz	„ 13	163	4	1	61·35
	Samostrzel	„ 14	167	1	1	59·88
	Konstantinowo ..	„ 23	230	1	..	..
	Rudtke	Oct. 27	99	1	..	..
r in Posen	Usch	Aug. 9	2,375	10	6	25·26
	Smolary	„ 16	314	1	..	..
	Steinach	„ 17	158	1	1	63·29
	Margoninsdorf ..	„ 20	62	1	..	..
	Chrostowo	„ 21	182	1	..	..
in	Josefkowo	„ 13	238	1	1	42·02
	Paulina	„ 13	266	5	2	75·19
	Laskownica	„ 16	163	1	1	61·35
e	Neuhöfen	„ 18	677	2	1	14·77
VERNMENT DISTRICT OF DANZIG.						
g Niederung	In Wesslinker Bay..	June 1	..	1	1	..
	Quarantine station at Gross-Plehnendorf	„ 5	..	11	..	..
	Letzkauerweide ..	„ 5	759	1	..	..
	Bohnsack	July 10	924	1	1	10·82
	Krakau	„ 19	476	2	1	21·01
	Klein-Plehnendorf	„ 26	668	8	4	59·88
	Holm	Aug. 1	330	8	1	30·30
	Westlich-Neufähr..	„ 9	677	1	1	14·77
	Einlage	„ 12	337	2	1	29·67
	Weichselmünde ..	„ 15	1,716	4	2	11·66
	Käsemark	„ 19	848	1	1	11·79
	Troyl	„ 20	355	4	2	56·34
	Stutthof	Sept. 3	2,492	2	..	..
hau	Dirschau	July 8	11,897	2	1	0·84
enburg in W.	Pieckel	„ 10	800	1	1	12·50
	Schöneberg	Aug. 24	1,574	2	1	6·35
	Platenhof	„ 31	174	8	1	57·47
	Tiegenhof	„ 31	2,622	35	11	41·95
	Marienburg	Oct. 18	10,279	2	1	0·97
zig	Danzig (Town) ..	July 13	119,211	22	6	0·50
	On board ship at Ebenda.	„ 15	..	5	2	..
stadt in W. ..	Sagorsch	„ 27	741	3	1	13·50
ng	Tolkemit	Sept. 3	3,051	83	44	144·22
	Jungfer	Oct. 12	929	4	2	21·53
ing (Town) ..	Elbing (Town) ..	„ 22	41,475	2	..	..
CITY OF BERLIN.						
lin	Berlin	July 18	1,579,244	1	..	..
VERNMENT DISTRICT OF GUMBINNEN.						
nnisburg ..	Niedczwedczen ..	July 31	183	72	21	1,147·54
	Wilken	Aug. 18	177	5	1	56·50
	Johannisburg ..	„ 24	3,222	1	1	3·10
dekrug	Warrus	Sept. 5	232	1	1	43·10
lerung ..	Tawellningken ..	Oct. 30	726	1	1	13·77
	Iodgallen	Nov. 8	434	5	2	46·08
VERNMENT DISTRICT OF KÖNIGSBERG.						
lsburg	Piasutten	Aug. 5	1,080	1	..	..
sz-Holland ..	Gut Draulitten ..	„ 10	163	2	2	122·70
iau	Agilla	„ 14	1,034	1	1	9·67
	Barracks at Grabenhof.	„ 20	..	4	4	..
	Grosz-Schmerberg	„ 30	74	3	..	..
	Vorwerk Kampken	Sept. 18	131	1	1	76·34
	Labiau	Oct. 27	4,861	2	..	..
	Grosz-Friedrichsgraben II.	„ 30	372	2	..	..

County (Kreis) or County Town (Stadt Kreis).	Place.	Date of first recorded case of Cholera, 1894.	Population, 1890.	Total recorded Cholera.		Cholera Death-rate per 10,000 population.
				Attacks.	Deaths.	
PRUSSIA—*cont.*						
GOVERNMENT DISTRICT OF KÖNIGSBERG—*cont.*						
Labiau	Dorf Wilhelmsrode	" 30	269	6	2	74·35
	Lauknen	" 30	856	1	1	11·68
	Nemonian	" 31	1,210	3	1	8·26
	Timber	Nov. 6	636	4	1	15·81
Königsberg (Town)	Königsberg in Pr (Town).	Aug. 15	161,666	6	4	0·25
	Boat at Königsberg	" 20	..	1	1	..
Osterode in Ost	Osterode in Ost ..	" 18	9,410	3	1	1·06
	Dungen	" 21	238	1	..	..
	Thyrau	Sept. 9	786	1	..	..
Fischhausen ..	Peyse	Aug. 22	608	1	1	16·45
	Pillau	Nov. 3	3,303	1	..	..
	Dorf Rudau	" 12	450	1	1	22·22
Mohrungen ..	Grosz-Wilmsdorf ..	Aug. 23	186	2	1	53·76
	Winkenhagen ..	" 28	384	4	2	52·08
Allenstein	Grieslienen	" 24	721	20	7	97·09
Memel	Bommelsritte ..	Sept. 2	3,378	7	3	8·88
	Memel	" 13	19,281	1	..	..
Wehlau	Wehlau	" 13	5,385	20	5	9·29
	Tapiau	" 21	3,763	1	..	..
	Langendorf	Nov. 8	84	6	..	..
Königsberg ..	Lapsau	Sept. 30	..	4	1	..
	Rosse	Oct. 10	116	3	2	172·41
GOVERNMENT DISTRICT OF FRANKFURT.						
Landsberg ..	Kladow	Aug. 10	1,121	3	2	17·84
	Zantoch	" 17	1,500	1	1	6·67
Landsberg	Landsberg (Town)..	" 18	28,065	5	3	1·07
Friedeberg in Neum...	Alt-Beelitz	" 21	559	1	..	..
Königsberg in Neum ..	Alt-Küstrinchen ..	Sept. 3	1,288	1	1	7·76
GOVERNMENT DISTRICT OF KÖLN.						
Köln (Town)	Köln (Town) ..	Aug. 10	273,727	1	1	0·04
GOVERNMENT DISTRICT OF DÜSSELDORF.						
Rees	Emmerich	Aug. 14	9,622	1	..	..
Ruhrort	Ruhrort	" 22	1,099	2	2	1·8[illegible]2
	Meiderich	Oct. 2	21,417	2	2	0·9[illegible]3
Duisberg (Town) ..	Duisburg (Town) ..	Sept. 8	59,285	4	2	0·[illegible]4
GOVERNMENT DISTRICT OF OSNABRÜCK.						
Meppen	Hüntel (Workmen's Barracks).	Aug. 15	..	1	..	—
GOVERNMENT DISTRICT OF POTSDAM.						
Oberbarnim	Freinenwelde ..	Aug. 22	7,259	1	1	1·38
Charlottenburg (Town)	Charlottenburg (Town).	Sept. 3	76,873	1	1	0·13
GOVERNMENT DISTRICT OF STETTIN.						
Stettin (Town) ..	Stettin (Town) ..	Aug. 28	113,421	2	2	0·18
GOVERNMENT DISTRICT OF KASSEL.						
Marburg	Bürgeln	Aug. 30	524	17	4	76·34
GOVERNMENT DISTRICT OF MERSEBURG.						
Torgau	Torgau	Sept. 2	10,824	1	1	0·92
GOVERNMENT DISTRICT OF AACHEN.						
Aachen (Town) ..	Aachen (Town) ..	Sept. 2	103,470	5	1	0·10
GOVERNMENT DISTRICT OF BRESLAU.						
Breslau	Breslau (Town) ..	Sept. 7	335,174	1	1	0·03

County (Kreis) or County Town (Stadt Kreis).	Place.	Date of first recorded case of Cholera, 1894.	Population, 1890.	Total recorded Cholera.		Cholera Death-rate per 10,000 population.
				Attacks.	Deaths.	
PRUSSIA—*cont.*						
GOVERNMENT DISTRICT OF MAGDEBURG.						
Stendal	Tangermünde ..	Sept. 15	7,415	1	1	1·35
GOVERNMENT DISTRICT OF LÜNEBURG.						
Lüchow	Bietze	Sept. 16	236	3	2	84·75
GOVERNMENT DISTRICT OF KOBLENZ.						
Neuwied	Neuwied	Oct. 12	11,062	2	1	0·90
GOVERNMENT DISTRICT OF LIEGNITZ.						
Glogau	Iätschau	Oct. 29	1,305	12	6	45·90
LUBECK.						
At sea on board a steamship		July 16	..	2	2	..
HAMBURG.						
Hamburg	Hamburg (Town and Suburbs).	Sept. 14	569,260	1	1	0·02

ITALY.

In July, when cholera was showing itself in Marseilles, there occurred between July 6th and 31st, 10 cholera cases, with 5 deaths, at Terzo, a small commune in the province of Alessandria.

On August 1st, a suspicious cholera case, which proved fatal, was reported from Savigliana. On August 5th another case, in the person of a marine engineer from Marseilles, occurred on board a ship in the harbour at Genoa. On August 25th, the captain of the steamer "Gyptis" died of cholera at Procida. His ship had arrived at Naples from Marseilles on the previous day. Soon after this there occurred at Naples some 50 choleraic cases, but the official reports do not state how many of them were fatal. At Procida, the mother of the captain of the "Gyptis" also died of cholera on September 6th.

Other suspected cholera cases occurred in the provinces of Campobasso and Caserta.

The total deaths from cholera in Italy during 1894, given in the official statistical report issued by the Government, numbered 20 as against 3,040 for the year 1893.

SWEDEN.

On July 3rd, a passenger from St. Petersburg, on board the S.S. "Von Dobeln," died of cholera at the quarantine station at Fejan. Twenty-two fellow passengers were detained under suspicion, and ultimately 13 of them developed the disease, and of these 3 died, making with the initial case 4 deaths out of 14 cases at the quarantine station between the 3rd and the 18th of July. During the month of August, a stewardess on board the S.S. "Nord Kusten," from St. Petersburg, developed cholera 24 hours after being placed in quaran-

On the Western Diffusion of Cholera in 1894-95; by Dr. Bruce Low.

tine at Fejan. A second case followed from the same ship. Both cases recovered. On the S.S. "Wasa" between August 17th and 19th at the Fejan quarantine station there occurred 13 cases with only one death. During the same month a man arrived at Stockholm from St. Petersburg where he had suffered, 3 weeks before, from cholera. He had been certified as cured of his cholera on August 9th, but bacteriological examination of his dejecta on his arrival in Sweden showed the presence of the cholera bacillus. In consequence of this he was sent for a time to the isolation hospital on the Island of Skotland, but no extension of the disease occurred.

Altogether there were reported in Sweden, during 1894, 30 cases of cholera, with only 5 deaths. It was in consequence of the possibility of the importation of cholera infection from St. Petersburg that the Swedish authorities ordered a quarantine of 40 hours for all vessels from that place entering Swedish ports, when there was no actual case of the disease on board. But where cholera existed on the ship the detention was extended to 2 weeks.

CHOLERA IN 1895.

Cholera, from which Europe had suffered during 1892, 1893 and 1894, again showed itself during 1895; but the centres of infection were far fewer, and the total cases and deaths from the disease were considerably reduced in number when compared with the previous years.

Epidemics of cholera in Russia, Austria, and Turkey, occurring towards the close of 1894, were continued during the early part of 1895. Recrudescence of this infection followed in the summer and autumn months, and these epidemics in certain instances continued into the early months of 1896. With the exception of the 3 countries named above, Europe was practically free from epidemic cholera. Only one death from the disease was recorded in the German Empire, probably an imported case from the Russian or Austrian frontier.

Following the Mohammedan holy pilgrimage or Hedjaz (which begins in April, and extends to July) there occurred cases of cholera in Egypt and Morocco, the suggestion being that the infection was brought back to these countries by the returning pilgrims, and in support of this view there appears to be reliable evidence. The outbreak in Morocco began at the end of August, 1895, and continued into the early months of 1896. The epidemic in Egypt began in a somewhat obscure way, with a series of unrecognised cases in September, and though the outbreak of 1895 was not on a very large scale, it proved the commencement of a very serious epidemic, that swept through Egypt in 1896, beginning in May of that year.

In other parts of the world, cholera was also prevalent in 1895, *e.g.*, in Argentina, Brazil, Hawaii, India, Corea, China, and Japan. The epidemic in Japan comprised no fewer than 45,174 cases, with 30,449 deaths. It is stated that in India no fewer than 320,979 deaths resulted from cholera during 1895.

The following short account of cholera outbreaks in 1895 is limited to those that occurred in Europe and in those countries with which Europeans are in immediate communication, *e.g.*, Turkey in Asia, Egypt, and Morocco.

The subjoined table shows the countries in Europe, and immediately adjacent, which suffered from cholera in 1895, their population, date when cholera invaded them, together with the number of reported attacks and deaths in each country.

Country.	Population.		Date of first recorded Cholera in 1895.	Cholera.	
	Number.	Date of Census.		Attacks.	Deaths.
Russia	119,032,750	1891	January ..	30,687	12 003
Austria	23,748,092	1890	,, ...	438	296
Turkey	21.836,000	1882	,, ..	6,833*	3,930*
Morocco	8,000,000	Estimated	August	3,886	2,114
Egypt	6,817.265	1882	September ...	1,107	923

* These numbers do not include the Cholera cases and deaths that occurred in connection with the holy pilgrimage to Mecca.

Russia.

At the end of 1894, cholera still persisted in certain governments of the Russian Empire. During December, 1894, cases were being reported from at least 14 governments. In January, 1895, cholera cases occurred in 6 governments, mostly in small numbers. In Volhynia alone the numbers were large, and it was on this government that the full force of the 1895 cholera epidemic in Russia fell. Indeed there were only two weeks in the year, *viz.*: the last 2 weeks in December, that cholera cases were not reported from Volhynia (see tabular weekly record appended).

The total number of reported cholera cases occurring in Russia during 1895 amounted to 30,687, with 12,003 deaths, a "fatality" of 39·11 per cent. In Volhynia, no less than 28,806 of these attacks occurred, with 11,095 deaths, leaving only 1881 cases of cholera and 908 deaths for the rest of the empire. These 1881 cases were distributed over 10 governments, the chief sufferers being Kief, 626 cases; Podolia, 444 cases; and the city of St. Petersburg, 554 cases (see Table appended). The chief centres invaded by cholera in the governments of Russia are given in tabular form below.

The St. Petersburg outbreak occurred in October, and cases continued to be reported till January, 1896. Previous to the October outbreak of 1895, there had been no recognised cholera cases in the city for 12 months, *i.e.*, from October 1894.

In August and September, 1895, a small outbreak of cholera occurred at and near Vladivostok. The infection, in all probability, was brought from Corea or Japan, where a wide-spread epidemic of cholera was prevailing at the time.

Compared with the cholera outbreaks of the previous three years, 1892-93-94, the epidemic of 1895 in Russia was of comparatively small dimensions. This is shown in the subjoined table: —

CHOLERA in RUSSIA.

——	1892.	1893.	1894.	1895.
Cases	331,077	99,550	63,980	30,687
Deaths	151,626	41.047	30.400	12,003

APP. A. No. 11.

n the West-
rn Diffusion
f Cholera in
894–95; by
r. Bruce Low.

TABLE I.—Showing CASES and DEATHS from

Week ending		Volhynia.		Kief.		Kovno.		Podolia.		Suwalki.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
January	7	15	8	...	...	...	...	69	37	10	4
	14	8	6	...	...	1	1	71	30	3	1
	21	7	3	...	...	...	...	41	23	...	...
	28	53	21	...	...	...	...	4	4	...	...
February	4	64	30	...	...	...	...	10	4	...	...
	11	12	12	...	..	...	...	12	7	...	...
	18	50	14	...	...	...	...	6	3	...	...
	25	53	13	...	...	...	...	3	3	...	...
March	4	45	17	..	...	...	...	...	...	...	...
	11	66	17	...	...	...	...	11	6	...	...
	18	36	17	...	...	...	...	12	4	...	...
	25	43	13	...	...	...	...	6	7	...	...
April	1	35	11	...	...	...	...	4	2	...	...
	8	76	21	...	...	...	...	5	4	...	...
	15	49	23	...	...	...	...	...	...	...	...
	22	28	19	...	...	...	...	...	...	...	...
	29	30	10	...	...	...	...	...	...	...	...
May	6	38	10	...	...	...	...	...	...	...	...
	13	19	8	...	...	...	...	...	...	...	...
	20	37	14	...	..	...	...	...	...	...	...
	27	27	5	...	...	...	...	...	...	...	...
June	3	28	10	...	...	...	...	...	...	...	...
	10	37	16	...	...	...	...	...	...	...	...
	17	60	9	...	...	...	...	1	1	...	...
	24	52	15	...	...	...	...	...	...	...	...
July	1	217	86	...	...	...	...	...	...	...	...
	8	158	56	...	...	...	...	...	...	...	...
	15	354	112	...	...	...	...	...	...	...	...
	22	1,149	336	...	...	...	...	...	...	...	...
	29	2,271	812	...	...	...	...	...	...	...	..
August	5	3,142	1,114	...	...	...	...	22	11	...	..
	12	3,806	1,487	...	...	...	...	12	9	...	..
	19	4,457	1,683	...	...	...	...	67	25	...	..
	26	2,833	1,193	...	...	...	...	35	11	...	..
September	2	2,481	1.001	4	1	...	...	16	8	...	..
	9	1,775	733	13	6	...	...	28	15	...	..
	16	1,334	509	41	18	...	...	9	3	...	..
	23	1,039	425	31	24	...	...	...	...	...	.
	30	750	316	28	13	...	...	...	...	...	.
October	7	565	215	23	8	...	...	...	...	...	.
	14	359	149	15	4	...	...	...	...	...	.
	21	333	151	41	16	...	...		...	...	.
	28	226	108	77	36	...	...	...	...	...	.
November	4	220	86	72	26	...	...	...	...	...	.
	11	244	107	101	34	...	...	...	...	...	.
	18	80	46	73	27	...	...	...	...	...	.
	25	25	14	45	24	...	..	...	...	...	.
December	2	14	8	40	14	...	...	...	...	...	.
	9	4	5	12	6	...	...	...	...	...	.
	16	2	1	1	...	...	...	...	...	...	.
	23	...	...	9	4	...	...	...	...	...	.
	30	...	...	...	1	...	...	...	...	...	.
		28,806	11,095	626	262	1	1	444	217	13	[illegible]

Cholera in Russia week by week during 1895.

Courland.		Orel.		St. Petersburg City.		St. Petersburg Government.		Tchernigof.		Maritime Province.		Total in Eleven Russian Governments.	
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
4	1	...	...	...	...	...	...	1	...	...	...	99	50
2	1	...	...	...	...	...	...	...	...	...	...	85	39
6	2	...	...	...	...	...	...	5	3	...	...	59	31
...	...	...	...	...	...	...	...	2	...	...	...	59	25
...	...	...	...	...	...	...	...	...	2	...	...	74	36
...	...	...	...	...	...	...	...	...	...	...	...	24	19
1	1	...	...	...	...	...	...	...	...	...	...	57	18
...	...	...	...	...	...	...	...	...	...	...	...	56	16
...	...	...	...	...	...	...	...	...	...	...	...	45	17
...	...	...	...	...	...	...	...	...	...	...	...	77	23
...	...	...	...	...	...	...	...	...	...	...	...	48	21
...	...	...	...	...	...	...	...	...	...	...	...	49	20
...	...	...	...	...	...	...	...	...	...	...	...	39	13
...	...	...	...	...	...	...	...	...	...	...	...	81	25
...	...	...	...	...	...	...	...	...	...	...	...	49	23
...	...		...	...	...	...	...	...	...	...	...	28	19
...	...	...	...	...	...	...	...	...	...	...	...	30	10
...	...	...	...	...	...	...	...	...	...	...	...	38	10
...	...	...	...	...	...	...	...	...	...	...	...	19	8
...	...	...	...	...	...	...	...	...	...	...	...	37	14
...	...	...	...	...	...	...	...	...	...	...	...	27	5
...	...	...	...	...	...	...	...	...	...	...	...	28	10
...	...	...	...	...	...	...	...	...	...	...	...	37	16
...	...	...	...	...	...	...	...	...	...	...	...	61	10
...	...	...	...	...	...	...	...	...	...	...	...	52	15
...	...	...	...	...	...	...	...	...	...	...	...	217	86
...	...	...	...	...	...	...	...	...	...	...	...	158	56
...	...	...	...	...	...	...	...	...	...	1	...	355	112
...	...	...	...	...	...	...	...	...	...	6	5	1,155	341
...	...	...	...	...	...	...	...	...	...	17	8	2,288	820
...	...	...	...	...	...	...	...	...	...	32	19	3,196	1,144
...	...	...	...	...	...	...	...	...	...	...	...	3,818	1,496
...	...	...	...	...	...	...	...	...	...	27	24	4,551	1,732
...	...	...	...	...	...	...	...	...	...	17	13	2,885	1,217
...	...	...	...	...	...	...	...	...	...	20	12	2,521	1,022
...	...	...	...	...	...	...	...	...	...	7	4	1,823	758
...	...	...	...	...	...	...	...	...	...	7	10	1,391	540
...	...	1	1	...	...	...	...	...	...	1	1	1,072	451
...	...	2	...	...	...	...	...	...	...	4	2	784	331
...	...	...	...	...	...	...	...	...	...	...	1	588	224
...	...	...	...	5	2	...	...	...	...	1	1	380	156
...	...	...	...	11	6	...	...	...	...	...	...	385	173
...	...	1	1	18	7	...	...	1	...	...	...	323	152
...	...	4	1	36	21	...	...	3	1	...	...	335	135
...	...	6	2	41	15	2	...	...	...	...	...	394	158
...	...	5	2	44	16	7	2	...	...	...	...	209	93
...	...	1	...	82	48	12	...	...	...	...	...	165	86
...	...	...	...	73	40	4	1	...	...	...	...	131	63
...	...	...	...	98	40	7	2	...	...	...	...	121	53
...	...	...	...	65	52	17	8	1	1	...	...	86	62
...	...	...	...	24	17	6	2	...	...	...	...	39	23
...	...	...	...	57	24	2	1	...	...	...	...	59	26
13	5	20	7	554	288	57	16	13	7	140	100	30,687	12,003

TABLE II.—CHOLERA in RUSSIA during 1895.

Governments invaded.

Governments.	Population, 1891.	Date when first Cholera recorded in 1895.	Recorded Cholera.		Rates per 10,000 of Population. Cholera.		Deaths per cent. of recorded Attacks.
			Attacks.	Deaths.	Attacks.	Deaths.	
Volhynia	1,511,926	January	28,806	11,095	190·53	73·38	38·52
Kief	3,139,937	September	626	262	1·99	0·83	41·85
Kovno	1,587,582	January	1	1	..	..	..
Podolia	2,617,253	"	444	217	1·70	0·83	48·87
Suwalki	695,904	"	13	5	..	..	38·46
Courland	712,700	"	13	5	..	..	38·46
Orel	2,107,442	September	20	7	..	..	35·00
St. Petersburg (City) ..	1,035,439	October	554	288	5·35	2·78	51·99
St. Petersburg (Government).	1,869,752	November	57	16	..	..	28·07
Tchernigof	2,214,377	January	13	7	..	..	53·85
Maritime Province ..	765,493	July	140	100	1·83	1·31	71·43
	18,257,805		30,687	12,003	16·78	6·56	39·11

Chief Centres of CHOLERA in RUSSIAN DEPARTMENTS during 1895.

Governments.	Name of Town.	Population.*	Recorded Cholera.		Rates per 10,000 of Population.		Deaths per cent. of recorded Attacks.
			Attacks.	Deaths.	Attacks.	Deaths.	
Volhynia ..	Zhitomir	54,827	451	218	82·26	39·76	48·34
	Vladimir-Volynsk	8,042	45	20	55·96	24·87	44·44
	Dubno	7,255	3,201	1,524	4,412·13	2,100·62	47·61
	Zaslav	10,117	5,888	2,320	5,819·90	2,293·17	39·40
	Kovel	4,919	336	136	683·07	276·48	40·48
	Kremenetz ..	10,579	6,262	2,023	5,919·27	1,912·28	32 31
	Loutzk	13,950	2,155	732	1,544·80	524·73	33·97
	Novograd-Vonynsk.	13,586	1,245	484	916·38	356·25	38·88
	Ovrentch	6,478	26	15	40·14	23·16	57·69
	Ostrog	16,522	5,536	2,195	3,350·68	1,328·53	39·65
	Rovno	7,295	1,707	670	2,339·96	918·44	39·25
	Starokonstantine.	15,605	1,964	756	1,258·57	484·46	38·49
		169.175	28,806	11,093	1,702·73	655·71	38·51
Kief	Berdicheff	56,980	629	262	110·39	45·98	41·65
St. Petersburg ..	St. Petersburg (City).	1,035,439	554	288	5·35	2·78	51·98
Podolia ..	Kaminietz Podolski.	35,841	47	26	13·11	7·25	55·32
	Letitchev	5,649	..	..	..	..	..
	Moghileff	18,421	93	57	50·49	30·94	61·29
	Olgopol	5,854	41	14	70·04	23·92	34·15
	Novo Usitcha ..	?	66	30	..	..	45·45
Maritime Province.	Vladivostok ..	8,800	105	75	119·32	85·23	71·43

* These populations are taken from a gazetteer published in 1889.

AUSTRIA.

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1894–95 ;
Dr. Bruc

Cholera, which had been epidemic in Austria in 1892, 1893, and 1894, again manifested itself in 1895, but to a much less extent. The cholera outbreak of 1894 in Galicia continued up to February 27th, 1895, when the province was declared free from infection. The epidemic proper of 1895 began in August, and was limited to 14 government districts in east Galicia. No other part of the Austrian Empire suffered from cholera in 1895.

The epidemic of 1895 (August to December) affected 50 communes, and comprised 453 attacks and 296 deaths. The principal centres of this cholera epidemic comprised a number of communes in the valley of the River Sereth, and some communes situated in the valley of the River Tajna.

In the valley of the Sereth, the first cholera cases were reported on August 23rd, from the Jewish quarter of the town of Tarnopol. It was suggested that the cholera infection had been carried across the Austrian frontier from the Russian government of Volhynia, where cholera was at the time raging severely. Many of those attacked at the first were navvies, and their families, employed in the construction of the Tarnapol-Ostrow-Halicz Railway.

Scattered groups of cases occurred in some of the other districts, but the disease never assumed the same epidemic proportions as in 1894.

The measures employed to check the disease were similar to those employed for the purpose in 1894, including isolation of the sick, disinfection of clothing, &c., the medical inspection of travellers, with regulation of the traffic and detention of suspected cases.

The appended tables give the statistics of cholera in Galicia for 1895.

TABLE I.—STATISTICS of CHOLERA in the several Departments (Politische Bezirke) of AUSTRIA invaded during the period AUGUST to DECEMBER 1895.

Department.	Places invaded.	Date of first recorded case of Cholera.	Population (Census 1890).	Number of recorded Cholera.	
				Attacks.	Deaths.
		1895.			
Tarnopol	10	Aug. 23	120,006	155	95
Brody	2	Sept. 1	130,707	2	2
Rohatyn	1	" 2	95,975	4	4
Zbaraz	1	" 6	66,722	2	1
Skalat...	3	" 13	84,047	7	3
Kamionka Strumilowka	4	" 22	97,051	52	34
Trembowla	15	" 25	71,823	123	86
Sokal	3	Oct. 6	90,025	21	11
Husiatyn	8	" 12	89,377	53	35
Czortków	5	" 13	64,741	17	15
Przemysl	2	" 18	121,383	8	4
Borszczów	2	" 20	106,755	5	3
Jaroslau	1	Nov. 12	119,988	2	2
Buczacz	1	" 15	113,170	2	1
	58	...	1,371,770	453	296

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r. Bruce Low.

TABLE II.—Showing the CHIEF CENTRES of CHOLERA in GALICIA during 1895.

Department.	Town or Village.	Date.		Population, 1890.	Total recorded Cholera.	
		First recorded.	Last recorded.		Attacks.	Deaths.
Borszczow	Muszkarów	Oct. 20, 1895	Oct. 20, 1895	521	2	1
	Pilatkowce	Nov. 15, 1895	Nov. 18, 1895	1,202	3	2
				1,723	5	3
Brody ..	Rudenkolackie ..	Nov. 10, 1895	Nov. 10, 1895	273	1	1
	Wertelka	Sept. 1, 1895	Sept. 1, 1895	624	1	1
				897	2	2
Buczacz ..	Pilawa	Nov. 15, 1895	Nov. 19, 1895	724	2	1
Czortków	Czortkow	Nov. 13, 1895	Dec 2, 1895	4,551	4	3
	Skorodynce	Oct. 13, 1895	Oct. 20, 1895	1,171	6	6
	Sosolówka	Nov. 19, 1895	Nov. 19, 1895	1,223	1	1
	Ulaszkowce	Oct. 25, 1895	Nov. 20, 1895	2,437	3	2
	Wygnanka	Nov. 2, 1895	Dec. 2, 1895	4,142	3	3
				13,524	17	15
Husiatyn	Husiatyn	Jan. 10, 1896	Jan. 10, 1896	6,291	1	..
	Liczkowce	Nov. 27, 1895	Nov. 27, 1895	2,068	2	1
	Olchowczyk ..	Dec. 3, 1895	Dec. 3, 1895	1,231	1	1
	Samoluskowce ..	Nov. 21, 1895	Nov. 29, 1895	1,342	3	2
	Celejów	Nov. 10, 1895	Nov. 17, 1895	824	2	1
	Chorostkow.. ..	Oct. 12, 1895	Nov. 14, 1895	6,455	25	17
	Nizborynowy ..	Nov. 11, 1895	Jan. 4, 1896	1,845	14	10
	Nizborgstary ..	Nov. 19, 1895	Nov. 28, 1895	1,113	5	3
				21,169	53	35
Jaroslau ..	Jaroslau	Nov. 12, 1895	Nov. 20, 1895	18,065	2	2
Kamionka Strumilowa	Ostrów	Nov. 7, 1895	Nov. 11, 1895	595	3	2
	Sielecbienków ..	Nov. 17, 1895	Nov. 17, 1895	2,297	4	1
	Radziechów.. ..	Oct. 13, 1895	Oct. 25, 1895	4,026	38	24
	Stojanów	Sept. 22, 1895	Oct. 9, 1895	2,912	7	7
				9,830	52	34
Przemyśl ..	Przemyśl (town) ..	Oct. 22, 1895	Jan. 9, 1896	35,209	4	1
	Wilcza	Oct. 18, 1895	Oct. 21, 1895	454	4	3
				35,663	8	4
Rohatyn ..	Obelnica	Sept. 2, 1895	Sept. 2, 1895	457	4	4

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epartment.	Town or Village.	Date.		Population, 1890.	Total recorded Cholera.	
		First recorded.	Last recorded.		Attacks.	Deaths.
kalat ..	Myslowa	Oct. 23, 1895	Oct. 26, 1895	920	3	2
	Panasówka	Sept. 13, 1895	Sept. 13, 1895	847	1	1
	Tarnoruda	Oct 23, 1895	Oct. 23, 1895	768	3	..
				2,535	7	3
Sokal ..	Byszów	Oct. 6, 1895	Nov. 10, 1895	817	14	7
	Perespa	..	..	916	4	3
	Sokal (town) ..	Nov. 24, 1895	Nov. 24, 1895	8,007	3	1
				9,740	21	11
Tarnapol ..	Krzywki	Oct. 18, 1895	Nov. 7, 1895	376	7	2
	Luczka	Oct. 27, 1895	Nov. 1, 1895	740	6	5
	Mikulince	Oct. 17, 1895	Oct. 27, 1895	4,079	4	3
	Wola Mazowiecka	Oct. 21, 1895	Oct. 23, 1895	781	5	3
	Berezowica Wielka	Sept. 2, 1895	Oct. 12, 1895	1,749	4	2
	Bucniów	Sept. 11, 1895	Oct. 29, 1895	2,258	16	13
	Iwaczów dolny ..	Oct. 6, 1895	Oct. 6, 1895	828	1	1
	Ostrów	Sept. 18, 1895	Nov. 3, 1895	1,672	32	20
	Tarnapol (town) ..	Aug. 23, 1895	Nov. 3, 1895	27,405	74	41
	Zagrobela	Sept. 18, 1895	Oct. 18, 1895	1,209	6	5
				41,097	155	95
Zbaraz ..	Zbaraz (town) ..	Sept. 6, 1895	Sept. 14, 1895	8,785	2	1
Trembowla	Budzanów	Oct. 11, 1895	Nov. 21, 1895	5,497	13	10
	Janów	Sept. 25, 1895	Nov. 26, 1895	2,602	11	9
	Bernadowka ..	Sept. 30, 1895	Sept. 30, 1895	591	1	1
	Brykulanowa ..	Nov. 22, 1895	Dec. 30, 1895	589	26	14
	Malow	Oct. 15, 1895	Nov. 3, 1895	517	11	8
	Naluze , ...	Oct. 25, 1895	Nov. 4, 1895	665	3	3
	Ostrowcryk ..	Oct. 20, 1895	Oct. 20, 1895	769	2	2
	Pantalicha	Dec. 12, 1895	Dec. 12, 1895	143	2	2
	Ruzdwiany	Oct. 9, 1895	Nov. 4, 1895	1,356	6	4
	Semenów	Nov. 2, 1895	Nov. 2, 1895	813	2	2
	Strusów	Oct. 4, 1895	Nov. 5, 1895	3,218	10	8
	Trembowla (town)	Jan. 2, 1896	Jan. 22, 1896	7,335	14	11
	Warwarynce ..	Oct. 6, 1895	Nov. 3, 1895	1,935	16	8
	Zazdrosó	Oct. 18, 1895	Oct. 18, 1895	1,659	1	
	Zubów	Oct. 11, 1895	Nov. 12, 1895	739	5	3
				28,428	123	86

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TURKEY.

Cholera, which had been occurring in Turkey during the latter months of 1894, continued to occur during the early months of 1895 in certain places such as Constantinople and Adalia. From November 14th, 1894, to May 6th, 1895, 212 deaths from cholera were reported in Constantinople, and between December 11th, 1894 and February 18th, 1895, 127 cholera deaths in Adalia. During January, 1895, localised groups of cases were reported from Bitlis and Siverek. But in May the epidemic of 1895 begun at Tarsus and Adana. The infection rapidly spread to Mersina and other places, and in July, the epidemic reached its height. The Vilayets of Adana, Aleppo, Kodavendkjar, Konia, Mamuret-ul-Aziz, and Diabekir were invaded. The total number of cholera cases reported in Turkey during 1895, amounted to 6,833 and the deaths to 3,930. The figures are probably understated. These numbers moreover do not include the cholera deaths which occurred in Arabia, where the disease became epidemic during the annual Hedjaz.

At the quarantine station, on the island of Camaran, at the mouth of the Red Sea, where 10 days quarantine is observed in the case of pilgrims going to the Hedjaz, cholera broke out on March 24th among pilgrims, who had arrived there by steamer on March 16th from Bombay. Between March 24th and April 24th, no less than 173 deaths were reported from Camaran, the sanitary condition of which place was unsatisfactory. On April 21st, cholera was reported from Mecca, where between that date and May 6th, 213 deaths from the disease occurred. Medina and Djeddah also became infected. On May 8th it was officially declared that cholera existed in the villages of the Hedjaz and amongst the Caravans. Of one large caravan, it is alleged that 4,000 fell victims to cholera on the journey from Mecca to Medina. In the village of Rebuk, there occurred 500 cholera deaths during the pilgrim season. The occurrence of cholera in the Hedjaz continued until the conclusion of the pilgrimage, and the disease was stated to have been carried by returning pilgrims to Egypt and Morocco.

It is not possible to ascertain the actual number of attacks and deaths from cholera which occurred among the pilgrims during 1895. One authority estimates the number who died on the Hedjaz, as about 5,000. But as some deaths certified from so-called "pilgrim diarrhœa," "dysentery," "gastro-entérite infectieuse," and "entérite á forme de choléra," &c., &c., may have been in reality Asiatic cholera, it is probable that the number of deaths far exceeded the above estimate.

The measures taken to arrest the spread of cholera in the Turkish Empire depended largely on the antiquated system of quarantine. At the termination of the 1895 outbreak it is stated that improvements were about to be carried out at the lazaretto of Camaran, including the provision of better accommodation for pilgrims, the provision of steam disinfectors, distilling apparatus, &c., &c.

MOROCCO.

Cholera was declared to be epidemic in Tangiers on September 6th. At first medical opinion attributed the outbreak to "indigenous poison," further investigation went to show that the malady was true Asiatic cholera, and that the specific infection had been brought by pilgrims who arrived on August 11th at Tangiers, in a steamer which had left El Tor on July 26th, at a time when cholera was known to exist there. The steamer carried 1,698 pilgrims, returning from the Hedjaz, who had undergone 15 days' detention at the quarantine station of El Tor. During the voyage home a number of the pilgrims died, and it is known that at least 40 bodies were buried at sea. Soon after the arrival of these pilgrims, cholera began to spread in Tangiers and thence to Tetuan, and later on to Fez. Accurate accounts of the total number of attacks and deaths are not obtainable, but it is known that in Tangiers, between September 1st and November 12th, 1,045 cases of cholera, with 775 deaths, occurred, and at Tetuan 2,841 attacks, with 1,339 deaths, a total of 3,886 attacks and 2,114 deaths from cholera in Morocco in about two months and a half. The disease was still showing itself at Fez in December, but the actual number of cases and deaths there is not definitely known. The spread of the disease among Spaniards, Jews, and Moors, was aided by the filthy conditions under which the poorer members of these communities lived, and by the obstinate refusal of the Moors to call in medical assistance when attacked by cholera.

EGYPT.

There has been no epidemic of cholera in Egypt since 1883. But in September, 1895, an outbreak of a suspicious nature began in the province of Sharkieh, at a village named El Ekhewa. The first notification of the occurrence of the outbreak came to the authorities from a paragraph on September 17th in an Arabic journal. On the 19th of September a sanitary inspector visited the village, in which he found 10 persons ill, of whom 4 died next day. It was afterwards found that between September 1st and 17th 22 persons had died, the sheikhs and omdehs as usual concealing and denying the existence of epidemic disease. Though the clinical features of the current illness closely resembled those of Asiatic cholera, bacteriological examination made in two cases gave only negative results. This choleraic outbreak was locally attributed to excessive consumption of "fessikh," that is, more or less putrid fish, and green dates.

At Manzaleh, on September 17th, a child died suddenly with choleraic symptoms; on September 22nd 3 persons were attacked with similar illness, and all died, one after the other, within a few days; 6 other deaths followed during the next week. The accounts of this outbreak as well as that at El-Ekhewa are somewhat indefinite. There was intercommunication between the two localities; indeed a traveller from Manzaleh district was found in a dying condition, suffering from the choleraic malady on the road to El-Ekhewa. Whether the disease spread from the first named to the last named locality, or *vice versa*, cannot be ascertained, but as the disease was at first concealed it is probable that the malady existed in the country before its presence became known to the Provincial Sanitary Officials.

On October 12th, some cases of a suspicious kind were notified at Damietta, presenting all the clinical characters of cholera. On October 14th, bacteriological examination of dejecta proved the cases

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On the Western Diffusion of Cholera in 1894-95; by Dr Bruce Low.

to be true Asiatic cholera. There is frequent communication between Manzaleh district and Damietta. Extension of cholera from Damietta to the neighbouring villages followed, the majority of the subsequent cases occurring along the eastern bank of the Nile in the Province of Dakahlieh. Some places on the western bank of the Nile in the Province of Garbieh, also were invaded; but the number of persons here attacked by cholera was comparatively small. During October some other places in the Province of Sharkieh were invaded. Late in November and in the early part of December, 4 fatal cases of cholera occurred in Cairo and one in Alexandria*; all imported cases.

From the charts accompanying the official report † on the winter outbreak of cholera in Egypt, in 1895, the following figures have been obtained. In these figures are not included the El-Ekhewa suspicious cases that occurred in September, when at least 24 deaths were caused by the choleraic outbreak.

TABLE showing the Number of CHOLERA ATTACKS and DEATHS in EGYPT during the Last Quarter, 1895.

———	Attacks.	Deaths.	Percentage. Case—Mortality.
October	539	407	75·5%
November	411	375	91·2%
December	157	141	89·8%
Total	1,107	923	83·4%

It is known that cases were, at the first, concealed from the authorities, and that deaths from cholera were attributed to other causes; so that the above figures in all probability do not show the full extent of the epidemic. This is the more likely when the extremely high rate of "fatality" (or case-mortality) is considered.

The outbreak of the last quarter of 1895 was but the precursor of a severe epidemic of cholera that swept over Egypt in 1896. The disease smouldered throughout the first quarter of 1896, but in May it developed epidemic proportions which reached their maximum in July, and persisted till September. The epidemic of 1896 comprised no less than 19,619 attacks and 16,337 deaths: 1,343 of the latter occurred in Cairo and 914 in Alexandria.

The mode in which the cholera infection was brought in 1895 to Egypt is not definitely known, but there are good grounds for believing that the disease was brought by pilgrims returning from the Hedjaz or Holy Pilgrimage. It is known that cholera was epidemic among the pilgrims, especially between Mecca and Medina at the end of June and beginning of July. Also it is known that a series of cases described as "gastro-entérite infectieuse" and "entérite á forme de chólera," proving rapidly fatal, occurred at the quarantine station of Tor, where also similar illness occurring among the soldiers forming the guard, was definitely pronounced to be cholera, after bacteriological examination. The sanitary arrangements at the Tor quarantine station were highly unsatisfactory. Further, it is stated that the arrangements for landing sick pilgrims at Suez were most defective. For example, between July 27th and 29th, 6 dead bodies of returning pilgrims were brought from the ships to the government hospital; one pilgrim died on the quay, one in the railway station, and one in the street. At the end of July and beginning of August, the greatest rush of returning pilgrims to Egypt takes place, and it is more than probable that cholera infection was brought back by them, and that the earlier cases, in the native villages of the pilgrims, were concealed. It was not till September that attention was drawn to the presence of the choleraic epidemic, and it was not till October that the presence of true Asiatic cholera in Egypt was recognised after bacteriological examination.

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* Cholera became prevalent in Alexandria in the early months of 1896.

† Report on the Epidemic of Cholera in Egypt during the years 1895–96 by (Pasha) Sir J. G. Rogers, K C.S.I., Director-General, Sanitary Department, Egypt.

The disease once established spread by the usual channels. The water supplies of Egypt are largely capable of pollution, and are in fact largely polluted. None of the towns or villages of Egypt have any satisfactory system of drainage. The habits of the people are filthy. The ablutions prescribed by religion are commonly performed at the nearest water supply. The bank of the river or canal is generally utilized as a public latrine, and the condition of the foreshore is inexpressibly filthy. Washing of soiled clothing, the performance of ablutions prescribed by religion after the calls of nature, and the drawing of drinking water, may all be seen in the act of being carried out within a few yards of one another.

In some towns the drainage of houses passes direct into the water-channel, as also does the discharge from mosque latrines. Sometimes these are built directly over the stream so that the excrement falls direct into the water. Among Mahomedan nations Egypt is peculiar in having medahs (shallow basins for performing ablutions), maghtahs (baths), and public latrines attached to the mosques. In Constantinople, and in India, no such arrangements exist. In numerous instances cases of cholera were concealed till they were at the point of death, and then the relations fled in order to escape being placed under observation for 6 days, and taking with them soiled clothing in order that it might not be disinfected. It is stated, in the official report already referred to, that the general filthy conditions under which the fellaheen live, especially the women, were the chief causes which helped to aid the spread of infection.

The general measures taken to arrest the epidemic comprised, protection of water supplies, the dividing of infected areas into districts under medical charge, daily inspection of villages and the supply of disinfectants and medicaments; isolation of the sick, and observation of inmates of infected houses for 6 days; disinfection of clothing and of houses, regulation of the boat traffic, with medical inspection of crew and passengers; inspection of railway passengers. Trains passing through infected districts had an ambulance attached. Special printed instructions as to boiling of drinking water, &c., were posted up in all public places. Official notices were issued, prohibiting the transport of rags by rail, and forbidding the manufacture of butter in infected districts.

The general conclusions arrived at by the Director-General of the

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Egyptian Sanitary Department, after careful consideration of all the circumstances of the epidemic, are as follows: —

1. That the diffusion of the disease from one place to another invariably followed the lines of human intercourse.

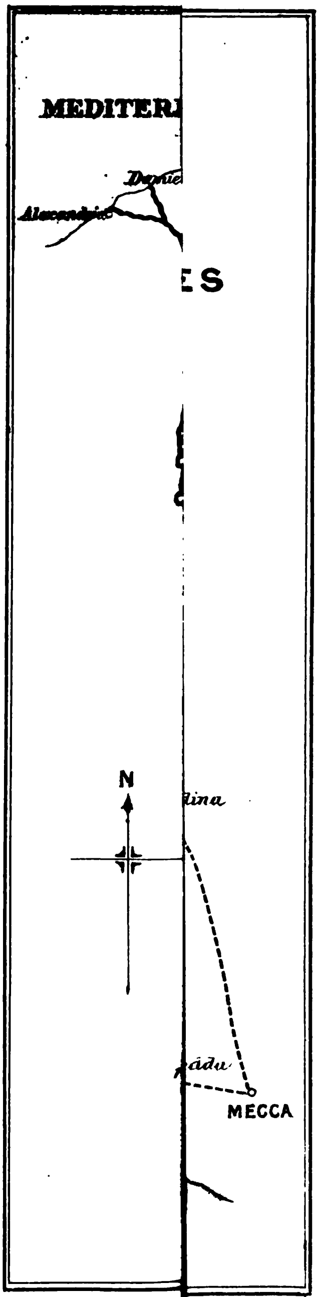
2. That the increased facilities for communication by land and water conduced to the increased rapidity in the diffusion of the disease.

3. That the incidence of the disease was heaviest where there was probable, if not certain, specific contamination of the water supply.

Finally he adds the following significant statement:—

" As long as the Mecca pilgrimage continues, so long will the country be liable to infection should the disease break out in the Hedjaz. It is not India which is a standing direct danger to Egypt, but her own pilgrims. There is but one satisfactory way to safeguard a country against cholera, and that is to put it in such a sanitary condition that even if introduced the disease will not find a favourable soil for its development. In this respect everything remains to be done."

The accompanying map, reproduced from the official report to the Egyptian Government on the cholera epidemic, shows the pilgrim routes by land and sea, from the Mahomedan Holy Land to Egypt, the quarantine stations for pilgrims, &c.



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Nos. 12 and 12A.

COMPILATION of RETURNS of NOTIFIED CASES of CERTAIN INFECTIOUS DISEASES, and REGISTERED DEATHS therefrom.

1897.

APP. A. No. 12.

Compilation of Returns of Notified Infectious Diseases, and registered Deaths therefrom.

It should be noted, with reference to these returns, that some of the districts to which they apply administer compulsory notification under local Acts; and that not only are some of the diseases named in the Infectious Disease (Notification) Act of 1889 not notifiable under some of the local Acts, but that under certain of these Acts no payment is made for the notification of multiple attacks of the same disease occurring in the same house within a specified date of the first attack notified.

The Urban Districts finding place in these returns in which compulsory notification has been adopted under local Acts are—

Accrington
Ashton-under-Lyne.
Birkenhead.
Blackburn.
Bolton.
Burnley.
Bury.
Croydon.
Darwen.
Derby.
Halifax.
Hartlepool.
Huddersfield.
Leicester.
Manchester.
Newcastle-on-Tyne.
Norwich.
Nottingham.
Oldham.
Preston.
Reading.
Rotherham.
Stockton-on-Tees.
Sunderland.
Swansea.
Wakefield.
Warrington.
West Ham.
Wigan.
Willesden.
York.

APP. A. No. 12.

Compilation of Returns of Notified Infectious Diseases, and registered Deaths therefrom.

No. 12.

TABLE showing Quarter by Quarter, during the Year 1897, for each CASES and of REGISTERED DEATHS from the under-mentioned each of the URBAN SANITARY DISTRICTS in question.

[The Cases are a Summary of the Weekly Returns of Notifiable Diseases received Quarterly Returns of

In Registration Divisions.	Urban Sanitary Districts.	Population (1891).	SMALL-POX.									
			1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total for 1897.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
I.	London .. .. .. (*Administrative Co.*)	4,232,118	64	12	26	2	9	2	6	..	105	16
II. South-Eastern.	Croydon	102,695	..	..	..	..	..	..	..	..	..	..
	Dover	33,300	..	..	..	..	..	..	..	..	..	..
	Eastbourne	34,969	..	..	..	..	..	..	..	..	..	..
	Portsmouth	159,278	..	..	..	..	..	..	..	..	..	..
	Bournemouth	37,781	..	..	..	..	..	..	..	..	..	..
	Southampton	65,325	2	..	..	..	..	..	5	..	7	..
	Reading	60,054	1	..	..	..	..	..	..	..	1	..
III. South Midland.	Willesden	61,265	1	..	..	..	..	..	..	..	1	..
	Hornsey	44,205	..	..	..	..	..	..	..	..	..	..
	Tottenham	71,343	1	..	..	..	..	..	..	..	1	..
	Oxford	45,742	..	..	..	..	..	..	..	..	..	..
	Northampton	61,012	..	..	..	..	..	..	..	..	..	..
	Cambridge	36,983	..	..	..	..	..	..	..	..	..	..
IV. Eastern.	Leyton	63,056	..	..	..	..	..	..	..	..	..	
	Walthamstow	46,346	..	..	..	..	..	..	..	..	..	
	West Ham	204,903	3	..	1	..	..	..	..	..	4	..
	Colchester	34,559	..	..	..	..	..	..	..	..	..	..
	Norwich	100,970	..	..	..	..	..	..	..	..	..	..
V. South-Western.	Exeter	37,404	..	..	..	..	..	..	..	..	..	..
	Plymouth	84,248	..	..	..	..	..	..	..	..	..	..
	Devonport	54,803	3	..	..	..	..	..	..	..	3	..
	Bath	51,844	..	..	..	..	..	..	..	..	..	..
VI. West Midland.	*Bristol	221,578	..	..	8	..	..	..	2	1	10	
	*St. George	36,718	..	..	..	..	..	..				
	Gloucester	39,444	..	..	..	..	..	..	..	..	..	
	Cheltenham	47,514	..	..	..	..	..	..	..	..	..	
	Hanley	54,946	..	..	..	..	..	..	..	..	..	
	Longton	34,327	..	..	..	..	..	..	..	..	..	
	Burton-on-Trent ..	46,047	..	..	..	..	..	..	..	..	..	
	Wolverhampton ..	82,662	..		..	..	..	..	..	..	..	
	Walsall	71,789	..	..	..	..	..	..	..	..	..	
	West Bromwich ..	59,474	..	..	..	..	..	..	..	..	..	
	Worcester..	42,908	..	..	..	..	..	..	..	..	..	
	Smethwick	36,170	..	..	..	..	..	..	..	..	..	
	Birmingham	478,113	..	..	..	..	..	..	..	..	..	
	Aston Manor	68.639	..	..	..	..	..	..	..	..	..	
	Coventry	52,724	..	..	..	..	..	..	..	..	..	
VII. North Midland.	Leicester	174,624	..	..	..	..	..	..	..	..	..	
	Grimsby	51,934	..	..	..	..	..	..	2	..	2	..
	Nottingham	213,877	..	..	..	..	..	..	..	..	..	..
	Derby	94,146	1	..	..	..	..	..	..	..	1	..

* These Districts were united by extension of the Borough of Bristol in November, 1897.

No. 12.

of 93 URBAN SANITARY DISTRICTS, the Number of NOTIFIED DISEASES, together with an ANNUAL SUMMARY of these data for

by the Board from Medical Officers of Health. The Deaths are extracted from the the Registrar-General.]

Compilation of Returns of Notified Infectious Diseases, and registered Deaths therefrom.

In Registration Divisions.	Urban Sanitary Districts.	Population (1891).	SMALL-POX—*continued.*									
			1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total for 1897.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
VIII. North-Western.	Stockport	70,263	..	..	..	..	..	..	..	..	..	..
	Macclesfield	36,000	..	..	..	.	..	..	..	..	..	..
	Chester	37,105	..	..	..	..	..	..	..	..	..	..
	Birkenhead	99,857	..	..	..	..	..	..	..	..	..	..
	Bootle	49,217	..	..	..	..	..	..	..	..	..	..
	Liverpool	629,443	4	..	2	..	..	..	..	..	6	..
	St. Helens (Lancs.) ..	71,288	..	..	..	..	..	..	..	..	..	..
	Southport..	41,406	..	..	..	..	..	..	..	..	..	..
	Wigan	55,013	..	..	..	..	..	..	..	..	..	..
	Warrington	52,743	..	..	..	..	..	..	..	..	..	..
	Bolton	115,002	..	..	..	..	..	..	..	..	..	..
	Bury (Lancs.)	57,212	..	..	..	..	..	..	..	..	..	..
	Salford	198,139	..	..	..	..	..	..	..	..	..	..
	Manchester	505,368	..	..	..	..	..	..	..	..	..	..
	Ashton-under-Lyne ..	40,463	..	..	..	..	..	..	..	..	..	..
	Oldham	131,463	..	..	..	..	..	..	..	..	..	..
	Rochdale	71,401	..	..	..	..	..	..	..	..	..	..
	Accrington	38,603	..	..	..	..	..	..	..	..	..	..
	Burnley	87,016	..	..	..	..	..	..	1	..	1	..
	Blackburn	120,064	..	..	..	..	..	..	..	..	..	..
	Darwen	34,192	..	..	..	..	..	..	..	..	..	..
	Preston	107,573	..	..	..	..	..	..	..	..	..	..
	Barrow-in-Furness ..	51,712	..	..	..	..	..	..	..	..	..	..
IX. Yorkshire.	Keighley	30,810	..	..	..	..	..	..	..	..	..	..
	Huddersfield	95,420	..	..	..	..	..	..	..	..	..	..
	Halifax	89,832	..	..	..	..	..	..	..	..	..	..
	Bradford	216,361	..	..	..	..	..	..	..	..	..	..
	Leeds	367,505	..	..	..	..	..	..	..	..	..	..
	Wakefield..	33,146	1	..	..	..	..	..	..	..	1	..
	Barnsley	35,427	..	..	..	..	..	..	..	..	..	..
	Sheffield	324,243	..	..	..	..	1	..	..	..	1	..
	Rotherham	42,061	..	..	1	1	..	..	4	..	5	1
	York	67,004	..	..	..	..	..	..	..	..	..	..
	Hull	200,044	1	..	2	..	2	1	..	..	5	1
	Scarborough	33,776	..	..	..	..	..	..	..	..	..	..
	Middlesbrough	75,532	..	..	..	..	..	..	12	..	12	..
X. Northern.	Darlington	38,060	..	..	..	..	..	..	..	..	..	..
	Stockton-on-Tees ..	49,705	..	..	..	..	..	..	..	..	..	..
	West Hartlepool ..	42,710	..	..	..	..	..	.	..	..	..	..
	Sunderland	131,015	1	..	..	..	..	..	1	..	2	..
	Jarrow	33,675	..	..	..	..	..	..	..	..	..	..
	South Shields	78,391	..	..	1	..	2	..	..	..	3	..
	Gateshead	85,692	..	..	..	..	1	..	2	..	3	..
	Newcastle-on-Tyne ..	186,300	..	..	..	..	..	..	..	..	..	..
	Tynemouth	46,588	..	..	..	..	2	..	2	..	4	..
	Carlisle	39,176	..	..	..	..	..	..	..	..	..	..
XI. Welsh.	Newport (Mon.) ..	54,707	1	..	..	..	..	..	..	..	1	..
	Cardiff	128,915	12	..	..	..	..	..	1	..	13	..
	*Rhondda	88,351	..	..	..	..	..	..	..	..	..	..
	Merthyr Tydfil	58,080	..	..	..	..	..	..	..	..	..	..
	Swansea	90,349	1	..	1	..	1	..	..	..	3	..
	Totals, 93 Districts ..	13,095,255	97	12	42	3	18	3	38	1	195	19

* Formerly called Ystradyfodwg.

APP. A. No. 12.

Compilation of Returns of Notified Infectious Diseases, and registered Deaths therefrom.

In Registration Divisions.	Urban Sanitary Districts.	Population (1891).	SCARLET FEVER.								
			1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		T fo
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases	Deaths.	Cases.
I.	London .. .. .. (*Administrative Co.*)	4,232,118	4,201	166	4,438	151	6,992	216	7,248	248	22,879
II. South-Eastern.	Croydon	102,695	164	6	92	3	163	2	145	1	564
	Dover	33,300	11	2	4	..	7	..	3	..	25
	Eastbourne	34,969	17	..	13	..	13	..	22	..	65
	Portsmouth	159,278	132	3	148	1	174	4	191	3	648
	Bournemouth	37,781	36	2	32	1	12	1	20	1	100
	Southampton	65,325	106	3	43	5	40	..	45	1	234
	Reading	60,054	17	..	10	..	20	..	28	3	75
III. South Midland.	Willesden	61,265	117	3	89	1	121	1	177	6	504
	Hornsey	44,205	98	..	50	1	52	..	63	1	263
	Tottenham	71,343	140	3	111	..	78	1	170	9	499
	Oxford	45,742	7	..	5	..	14	..	20	..	46
	Northampton	61,012	130	12	136	8	273	9	319	17	858
	Cambridge	36,983	6	..	3	..	15	..	27	..	51
IV. Eastern.	Leyton	63,056	107	4	73	3	167	6	165	3	512
	Walthamstow	46,346	64	1	87	1	119	1	203	3	470
	West Ham	204,903	235	8	210	14	328	6	395	2	1,168
	Colchester	34,559	27	1	41	..	153	5	36	..	257
	Norwich	100,970	109	5	109	1	138	2	316	3	672
V. South-Western.	Exeter	37,404	3	..	1	..	7	..	3	..	14
	Plymouth	84,248	28	2	23	1	11	..	17	2	79
	Devonport	54,803	8	..	20	1	24	..	33	2	85
	Bath	51,844	97	3	42	1	22	1	33	..	194
VI. West Midland.	*Bristol	221,578	172	6	114	6	99	3	158	3	614
	*St. George	36,718	29	..	19	..	23	..		1	
	Gloucester	39,444	25	..	84	2	128	4	119	7	356
	Cheltenham	47,514	54	..	42	..	47	..	81	1	224
	Hanley	54,946	76	5	54	1	67	6	38	1	235
	Longton	34,327	11	1	15	..	16	..	10	..	52
	Burton-on-Trent ..	46,047	85	..	101	3	78	1	89	4	353
	Wolverhampton ..	82,662	92	3	80	5	153	11	218	2	543
	Walsall	71,789	108	3	271	13	246	10	199	4	824
	West Bromwich ..	59,474	52	2	38	2	91	5	162	11	343
	Worcester	42,908	60	2	16	..	27	..	46	..	149
	Smethwick	36,170	30	..	18	..	27	..	93	3	168
	Birmingham	478,113	403	24	404	13	592	18	541	38	1,940
	Aston Manor	68,639	102	5	47	..	123	3	105	..	377
	Coventry	52,724	35	1	44	3	65	1	75	1	219
VII. North Midland.	Leicester	174,624	490	16	311	25	503	18	446	12	1,75
	Grimsby	51,934	34	2	56	1	25	..	19	..	13
	Nottingham	213,877	118	13	100	11	145	4	147	8	51
	Derby	94,146	83	1	102	4	124	..	121	5	43

* These Districts were united by extension of the Borough of Bristol in November,

In Registration Divisions.	Urban Sanitary Districts.	Population (1891).	SCARLET FEVER—*continued.*									
			1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total for 1897.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
VIII. North-Western.	Stockport	70,263	78	6	73	4	100	3	125	4	376	17
	Macclesfield	36,000	18	2	8	..	20	1	15	1	61	4
	Chester	37,105	28	..	9	1	33	1	60	3	130	5
	Birkenhead	99,857	165	5	87	3	132	6	243	9	627	23
	Bootle	49,217	62	4	38	2	48	1	95	6	243	13
	Liverpool	629,443	845	56	375	40	760	48	820	62	2,800	206
	St. Helens (Lancs.) ..	71,288	333	13	190	16	156	6	237	8	916	43
	Southport	41,406	69	4	46	2	28	..	37	..	180	6
	Wigan	55,013	21	..	28	..	61	5	82	5	192	10
	Warrington	52,743	23	2	11	1	8	..	5	..	47	3
	Bolton	115,002	117	4	75	4	227	8	227	7	646	23
	Bury (Lancs.)	57,212	79	5	48	3	64	4	65	5	256	17
	Salford	198,139	156	19	100	10	220	15	227	17	703	61
	Manchester	505,368	337	21	337	26	524	29	604	48	1,802	124
	Ashton-under-Lyne ..	40,463	74	3	13	1	9	..	21	2	117	6
	Oldham	131,463	136	9	67	3	58	5	68	3	329	20
	Rochdale	71,401	33	1	24	5	21	..	17	1	95	7
	Accrington	38,603	76	6	69	2	60	1	121	1	326	10
	Burnley	87,016	10	..	11	1	24	1	37	3	82	5
	Blackburn	120,064	47	1	26	2	33	3	68	1	174	7
	Darwen	34,192	17	2	18	1	35	..	33	1	103	4
	Preston	107,573	21	2	16	..	8	1	8	2	53	5
	Barrow-in-Furness ..	51,712	60	..	44	1	54	4	32	1	190	6
IX. Yorkshire.	Keighley	30,810	21	1	11	3	7	1	5	..	44	5
	Huddersfield	95,420	146	4	152	8	190	11	170	9	658	32
	Halifax	89,832	79	1	127	4	107	5	163	11	476	21
	Bradford	216,361	80	4	82	2	94	1	75	2	331	9
	Leeds	367,505	401	31	305	15	468	14	614	34	1,788	94
	Wakefield	33,146	22	2	21	2	15	..	33	2	91	6
	Barnsley	35,427	74	7	39	3	74	7	44	5	231	22
	Sheffield	324,243	399	28	304	19	431	17	487	26	1,621	90
	Rotherham	42,061	50	1	30	1	27	2	107	6	214	10
	York	67,004	31	2	19	..	44	1	172	..	266	3
	Hull	200,044	342	13	334	14	384	19	432	15	1,492	61
	Scarborough	33,776	14	2	35	..	87	1	67	3	203	6
	Middlesbrough	75,532	61	1	36	3	44	2	103	5	244	11
X. Northern.	Darlington	38,060	55	1	61	4	57	2	55	2	228	9
	Stockton-on-Tees ..	49,705	8	..	18	1	22	..	22	2	70	3
	West Hartlepool ..	42,710	16	..	17	..	26	1	36	4	95	5
	Sunderland	131,015	110	..	90	6	73	3	121	2	394	11
	Jarrow	33,675	32	1	14	..	13	..	11	..	70	1
	South Shields	78,391	151	6	144	3	158	3	166	2	619	14
	Gateshead .. .	85,692	57	4	47	1	89	4	137	8	330	17
	Newcastle-on-Tyne ..	186,300	104	5	84	4	99	7	225	5	512	21
	Tynemouth	46,588	24	..	23	..	17	..	15	..	79	..
	Carlisle	39,176	19	..	21	..	27	..	189	8	256	8
XI. Welsh.	Newport (Mon.) ..	54,707	49	2	42	..	31	1	66	2	188	5
	Cardiff	128,915	249	4	163	8	166	3	186	2	764	17
	*Rhondda	88,351	88	4	83	1	172	6	225	8	568	19
	Merthyr Tydfil	58,080	49	3	46	3	63	8	54	2	212	16
	Swansea	90,349	127	2	105	2	76	1	137	5	445	10
	Totals, 93 Districts ..	13,095,255	13,582	602	11,862	517	17,263	601	19,713	766	62,420	2,486

* Formerly called Ystradyfodwg.

APP. A. No. 12.

Compilation of Returns of Notified Infectious Diseases, and registered Deaths therefrom.

In Registration Divisions.	Urban Sanitary Districts.	Population (1891).	DIPHTHERIA.									
			1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total for 1897.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
I.	London .. .. .. (*Administrative Co.*)	4,232,118	2,920	641	2,648	428	3,422	488	3,822	705	12,812	2,262
II. South-Eastern.	Croydon	102,695	25	1	36	..	30	2	40	5	131	8
	Dover	33,300	16	4	10	2	7	..	11	3	44	9
	Eastbourne	34,969	39	4	34	8	24	3	20	3	117	18
	Portsmouth	159,278	25	4	18	2	51	11	53	11	147	28
	Bournemouth	37,781	3	..	7	1	7	6	17	..	34	7
	Southampton	65,325	26	5	13	3	8	1	7	..	54	9
	Reading	60,054	..	..	..	..	3	1	2	..	5	1
III. South Midland.	Willesden	61,265	63	10	40	11	56	11	120	34	279	[illegible]
	Hornsey	44,205	22	7	10	2	20	2	37	5	89	16
	Tottenham	71,343	49	7	38	5	38	10	54	7	179	[illegible]
	Oxford	45,742	10	2	4	..	..	..	6	..	20	[illegible]
	Northampton	61,012	1	..	1	..	4	1	2	2	8	[illegible]
	Cambridge	36,983	3	..	3	..	3	..	5	1	14	[illegible]
IV. Eastern.	Leyton	63,056	43	5	26	2	42	7	48	8	159	[illegible]
	Walthamstow	46,346	28	5	31	6	45	6	55	12	159	[illegible]
	West Ham	204,903	141	30	170	19	138	19	222	33	671	[illegible]
	Colchester..	34,559	6	2	5	1	8	1	12	2	31	6
	Norwich	100,970	12	1	5	2	17	3	28	4	62	[illegible]
V. South-Western.	Exeter	37,404	4	1	2	..	2	..	4	1	12	2
	Plymouth..	84,248	13	1	12	3	5	..	27	9	57	13
	Devonport	54,803	10	6	19	4	5	2	3	1	37	13
	Bath	51,844	17	6	18	4	8	2	22	3	65	15
VI. West Midland.	*Bristol	221,578	57	12	59	5	43	10	52	8	239	35
	*St. George	36,718	17	5	2	2	9	3		1		11
	Gloucester	39,444	37	11	37	6	35	12	28	7	137	36
	Cheltenham	47,514	9	1	11	2	6	1	15	2	41	6
	Hanley	54,946	12	3	6	3	9	2	10	5	37	13
	Longton	34,327	77	23	50	6	161	30	297	39	585	98
	Burton-on-Trent ..	46,047	22	4	11	1	10	1	23	3	66	9
	Wolverhampton ..	82,662	71	10	70	8	77	11	91	25	309	54
	Wallsall	71,789	13	5	11	2	8	2	5	1	37	10
	West Bromwich ..	59,474	9	2	9	9	9	5	13	4	40	20
	Worcester..	42,908	45	9	14	3	30	8	79	13	168	33
	Smethwick	36,170	6	3	11	1	2	1	46	13	65	18
	Birmingham	478,113	185	57	165	30	138	26	174	34	662	147
	Aston Manor	68,639	27	4	24	8	19	1	27	4	97	17
	Coventry	52,724	1	2	2	..	5	4	6	..	14	6
VII. North Midland.	Leicester	174,624	38	14	37	9	70	22	78	28	223	73
	Grimsby	51,934	23	8	18	6	19	4	22	10	82	28
	Nottingham	213,877	17	6	25	3	13	5	17	7	72	21
	Derby	94,146	13	3	8	1	13	2	23	3	57	9

*These Districts were united by extension of the Borough of Bristol in November, 1897.

APP. A. No.

Compilation Returns of Notified Infe tious Diseas and register Deaths there from.

In Registration Divisions.	Urban Sanitary Districts.	Population (1891).	DIPHTHERIA—*continued.*									
			1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total for 1897.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
VIII. North-Western.	Stockport	70,263	2	..	2	2	3	2	6	..	13	4
	Macclesfield	36,000	20	2	8	4	4	..	1	1	33	7
	Chester	37,105	26	6	21	2	9	..	4	..	60	8
	Birkenhead	99,857	18	8	16	3	11	6	34	9	79	26
	Bootle	49,217	..	..	7	2	5	3	5	3	17	8
	Liverpool	629,443	99	33	68	24	74	26	130	43	371	126
	St. Helens (Lancs.) ..	71,288	21	8	7	3	9	1	19	9	56	21
	Southport	41,406	1	..	4	1	9	2	11	3	25	6
	Wigan	55,013	3	1	2	..	3	1	15	2	23	4
	Warrington	52,743	2	2	1	..	4	.	..	..	7	2
	Bolton	115,002	8	2	3	3	6	1	..	..	17	6
	Bury (Lancs.)	57,212	4	..	1	1	4	..	11	4	20	5
	Salford	198,139	31	14	21	5	31	4	27	9	110	32
	Manchester	505,368	29	11	27	8	32	11	51	17	139	47
	Ashton-under-Lyne ..	40,463	3	2	4	3	..	.	1	2	8	7
	Oldham	131,463	19	7	5	3	3	..	11	1	38	11
	Rochdale	71,401	2	2	3	2	4	..	3	3	12	7
	Accrington	38,603	8	..	3	..	6	1	15	7	32	8
	Burnley	87,016	20	6	39	14	65	16	85	24	209	60
	Blackburn	120,064	2	1	3	1	3	1	5	5	13	8
	Darwen	34,192	1	1	2	1	..	..	..	..	3	2
	Preston	107,573	7	1	2	1	10	1	5	1	24	4
	Barrow-in-Furness ..	51,712	4	1	2	..	6	2	2	..	14	3
IX. Yorkshire.	Keighley	30,810	5	1	2	..	..	..	4	2	11	3
	Huddersfield	95,420	18	8	14	5	8	4	16	3	56	20
	Halifax	89,832	15	2	8	2	20	2	20	3	63	9
	Bradford	216,361	9	7	11	5	3	..	5	3	28	15
	Leeds	367,505	52	17	41	12	22	8	62	30	177	67
	Wakefield	33,146	1	..	7	..	7	..	6	..	21	..
	Barnsley	35,427	2	2	6	2	3	..	4	..	15	4
	Sheffield	324,243	27	11	30	17	17	5	26	11	100	44
	Rotherham	42,061	3	1	3	..	8	3	9	5	23	9
	York	67,004	2	..	12	1	10	1	12	2	36	4
	Hull	200,044	44	9	44	9	68	9	39	5	195	32
	Scarborough	33,776	3	..	2	..	..	..	1	..	6	..
	Middlesbrough	75,532	2	2	6	3	9	4	20	7	37	16
X. Northern.	Darlington	38,060	4	1	1	..	2	..	..	..	7	1
	Stockton-on-Tees ..	49,705	3	1	8	3	3	1	5	1	19	6
	West Hartlepool ..	42,710	3	1	..	1	1	..	1	..	5	2
	Sunderland	131,015	6	..	7	2	13	1	5	1	31	4
	Jarrow	33,675	6	1	5	2	7	..	7	..	25	3
	South Shields	78,391	12	4	10	2	8	2	3	..	33	8
	Gateshead	85,692	8	2	6	1	4	1	10	4	28	8
	Newcastle-on-Tyne ..	186,300	25	7	17	4	15	5	46	9	103	25
	Tynemouth	46,588	7	3	4	1	2	..	1	1	14	5
	Carlisle	39,176	15	3	8	2	4	2	10	2	37	9
XI. Welsh.	Newport (Mon.)	54,707	14	4	7	2	2	..	5	1	28	7
	Cardiff	128,915	90	18	98	16	90	17	235	39	513	90
	*Rhondda	88,351	18	8	24	13	80	25	111	27	222	73
	Merthyr Tydfil	58,080	49	13	29	10	14	2	31	16	123	41
	Swansea	90,349	7	4	6	..	9	2	20	5	42	11
	Totals, 93 Districts ..	13,095,255	4,935	1,162	4,387	806	5,349	898	6,778	1,376	21,449	4,242

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* Formerly called Ystradyfodwg.

In Registration Divisions.	Urban Sanitary Districts.	Population (1891).	"FEVER."									
			1st Quarter.					2nd Quarter.				
			Notifications.					Notifications.				
			Typhus.	Enteric.	Continued.	Total.	Deaths.	Typhus.	Enteric.	Continued.	Total.	Deaths.
I.	London .. .. (*Administrative Co.*)	4,232,118	1	593	19	613	127	1	464	7	472	85
II. South-Eastern.	Croydon	102,695	..	17	..	17	2	..	8	1	9	5
	Dover	33,300	..	4	..	4	3	..	2	..	2	..
	Eastbourne	34,969	..	3	..	3	..	..	..	..	..	[illegible]
	Portsmouth	159,278	..	21	9	30	4	..	47	10	57	[illegible]
	Bournemouth	37,781	..	3	..	3	..	..	1	1	2	[illegible]
	Southampton	65,325	..	8	1	9	2	..	12	..	12	[illegible]
	Reading	60,054	..	13	..	13	2	..	7	..	7	[illegible]
III. South Midland.	Willesden	61,265	..	14	1	15	4	..	10	..	10	1
	Hornsey	44,205	..	8	..	8	..	..	4	..	4	..
	Tottenham	71,343	..	15	..	15	..	..	6	..	6	2
	Oxford	45,742	..	4	..	4	1	..	2	..	2	1
	Northampton	61,012	..	5	..	5	1	..	2	..	2	1
	Cambridge	36,983	..	12	..	12	..	..	5	..	5	1
IV. Eastern.	Leyton	63,056	..	14	..	14	1	..	20	1	21	3
	Walthamstow	46,346	..	16	..	16	2	..	14	..	14	1
	West Ham	204,903	..	46	..	46	5	..	37	5	42	4
	Colchester	34,559	..	..	..	..	..	..	2	..	2	..
	Norwich	100,970	..	18	..	18	3	..	25	..	25	1
V. South-Western.	Exeter	37,404	..	7	1	8	1	..	14	4	18	4
	Plymouth	84,248	..	10	..	10	2	..	4	..	4	1
	Devonport	54,803	..	3	..	3	..	..	3	..	3	1
	Bath	51,844	..	1	..	1	1	..	3	..	3	..
VI. West Midland.	*Bristol	221,578	..	20	..	20	3	..	16	1	17	5
	*St. George	36,718	..	2	..	2	..	..	3	..	3	..
	Gloucester	39,444	..	3	..	3	2	..	7	..	7	1
	Cheltenham	47,514	..	3	..	3	..	..	2	..	2	1
	Hanley	54,946	..	26	1	27	..	..	9	2	11	2
	Longton	34,327	..	4	..	4	..	..	14	..	14	3
	Burton-on-Trent . ..	46,047	..	8	1	9	1	..	9	..	9	1
	Wolverhampton	82,662	..	20	1	21	5	..	15	1	16	1
	Walsall	71,789	..	16	1	17	3	..	10	1	11	2
	West Bromwich	59,474	..	7	..	7	1	..	5	1	6	1
	Worcester	42,908	..	5	..	5	..	..	4	1	5	1
	Smethwick	36,170	..	6	..	6	2	..	9	..	9	2
	Birmingham	478,113	..	138	2	140	23	1	96	..	97	21
	Aston Manor	68,639	..	18	..	18	5	..	15	2	17	2
	Coventry	52,724	..	7	..	7	3	..	6	..	6	1
VII. North Midland.	Leiceister	174,624	..	79	..	79	13	..	24	..	24	8
	Grimsby	51,934	..	23	4	27	4	..	18		18	2
	Nottingham	213,877	..	119	..	119	16	..	49	.	49	7
	Derby	94,146	..	25	..	25	6	..	18	..	18	1

* These Districts were united by extension of the Borough of Bristol in November, 1897.

“FEVER.”															
3rd Quarter.					4th Quarter.					Totals for 1897.					Urban Sanitary Districts.
Notifications.					Notifications.					Notifications.					
Typhus.	Enteric.	Continued.	Total.	Deaths.	Typhus.	Enteric.	Continued.	Total.	Deaths.	Typhus.	Enteric.	Continued.	Grand Total.	Deaths.	
1	935	23	959	144	1	1,121	16	1,138	237	4	3,113	65	3,182	593	London. (*Administrative Co.*
..	13	..	13	2	..	13	..	13	..	..	51	1	52	9	Croydon.
..	3	2	5	1	..	1	..	1	1	..	10	2	12	5	Dover.
..	6	..	6	..	..	2	..	2	..	..	11	..	11	..	Eastbourne.
..	146	23	169	17	..	96	14	110	9	..	310	56	366	43	Portsmouth.
..	7	..	7	2	..	3	..	3	1	..	14	1	15	5	Bournemouth.
..	25	1	26	2	..	21	..	21	1	..	66	2	68	6	Southampton.
..	13	..	13	1	..	13	..	13	1	..	46	..	46	6	Reading.
..	17	..	17	3	..	12	..	12	4	..	53	1	54	12	Willesden.
..	8	..	8	..	..	8	..	8	..	..	28	..	28	..	Hornsey.
..	49	2	51	5	..	48	..	48	2	..	118	2	120	9	Tottenham.
..	13	..	13	2	..	11	..	11	2	..	30	..	30	6	Oxford.
..	7	..	7	2	..	9	..	9	3	..	23	..	23	7	Northampton.
..	32	..	32	3	..	27	1	28	4	..	76	1	77	8	Cambridge.
..	41	..	41	7	1	37	5	43	3	1	112	6	119	14	Leyton.
..	30	..	30	5	..	19	..	19	5	..	79	..	79	13	Walthamstow.
..	95	2	97	12	..	114	4	118	27	..	292	11	303	48	West Ham.
..	7	3	10	3	..	15	..	15	5	..	24	3	27	8	Colchester.
..	124	..	124	16	..	77	..	77	12	..	244	..	244	32	Norwich.
..	43	4	47	5	..	32	1	33	7	..	96	10	106	17	Exeter.
..	28	..	28	3	..	7	..	7	2	..	49	..	49	8	Plymouth.
..	16	..	16	7	..	7	..	7	..	..	29	..	29	8	Devonport.
..	2	..	2	..	..	6	..	6	2	..	12	..	12	3	Bath.
..	38	..	38	5	..	269	..	269	34	..	353	1	354	47	Bristol.
..	5	..	5	1					1					2	St. George.
..	6	..	6	2	..	11	..	11	1	..	27	..	27	6	Gloucester.
..	2	..	2	..	..	13	..	13	1	..	20	..	20	2	Cheltenham.
..	4	4	8	1	..	26	6	32	4	..	65	13	78	7	Hanley.
..	23	..	23	2	..	17	..	17	1	..	58	..	58	6	Longton.
..	16	..	16	..	..	13	..	13	5	..	46	1	47	7	Burton-on-Trent.
..	50	..	50	7	..	19	..	19	11	..	104	2	106	24	Wolverhampton.
..	20	..	20	4	..	23	..	23	4	..	69	2	71	13	Walsall.
..	17	1	18	3	..	16	..	16	3	..	45	2	47	8	West Bromwich.
..	7	..	7	1	..	4	..	4	1	..	20	1	21	3	Worcester.
..	8	..	8	1	..	10	..	10	1	..	33	..	33	6	Smethwick.
..	123	..	123	22	..	182	..	182	26	1	539	2	542	92	Birmingham.
..	12	..	12	..	..	33	1	34	5	..	78	3	81	12	Aston Manor.
..	7	..	7	..	..	4	..	4	..	..	24	..	24	4	Coventry.
..	52	..	52	4	..	59	..	59	14	..	214	..	214	39	Leicester.
..	58	2	60	3	..	23	2	25	2	..	122	8	130	11	Grimsby.
..	141	..	141	12	..	124	..	124	14	..	433	..	433	49	Nottingham.
..	37	..	37	10	..	44	..	44	9	..	124	..	124	26	Derby.

In Registration Divisions.	Urban Sanitary Districts.	Population (1891).	"FEVER."									
			1st Quarter.					2nd Quarter.				
			Notifications.					Notifications.				
			Typhus.	Enteric.	Continued.	Total.	Deaths.	Typhus.	Enteric.	Continued.	Total.	Deaths.
VIII. North-Western.	Stockport	70,263	..	10	1	11	1	..	9	..	9	6
	Macclesfield	36,000	..	11	..	11	4	..	3	..	3	..
	Chester..	37,105	..	27	..	27	1	..	3	..	3	..
	Birkenhead	99,857	1	17	2	20	4	..	15	..	15	5
	Bootle	49,217	4	10	2	16	2	..	13	..	13	1
	Liverpool	629,443	52	129	12	193	26	23	150	17	190	20
	St. Helens (Lancs.)	71,288	..	22	..	22	3	..	13	..	13	4
	Southport	41,406	..	8	..	8	1	..	3	..	3	..
	Wigan	55,013	1	23	..	24	3	..	9	..	9	2
	Warrington	52,743	..	5	..	5	..	..	3	..	3	1
	Bolton	115,002	..	28	..	28	4	..	15	..	15	1
	Bury (Lancs.)	57,212	..	11	3	14	5	..	9	1	10	3
	Salford	198,139	..	61	3	64	15	..	53	2	55	7
	Manchester	505,368	3	101	..	104	35	..	62	..	62	8
	Ashton-under-Lyne ..	40,463	..	24	1	25	7	..	3	3	6	4
	Oldham	131,463	2	27	..	29	3	..	14	..	14	5
	Rochdale	71,401	..	6	..	6	1	..	2	..	2	..
	Accrington	38,603	..	5	..	5	1	..	9	..	9	1
	Burnley	87,016	..	23	..	23	2	..	18	..	18	4
	Blackburn	120,064	1	52	..	53	12	..	14	..	14	8
	Darwen	34,192	..	7	1	8	..	..	8	..	8	3
	Preston..	107,573	..	43	..	43	7	1	14	..	15	3
	Barrow-in-Furness ..	51,712	..	18	8	26	2	..	15	3	18	..
IX. Yorkshire.	Keighley	30,810	..	17	2	19	3	..	9	..	9	4
	Huddersfield	95,420	..	8	..	8	4	1	6	..	7	..
	Halifax..	89,832	..	27	1	28	6	..	7	..	7	2
	Bradford	216,361	..	25	..	25	7	..	21	..	21	7
	Leeds	367,505	..	58	4	62	11	..	43	2	45	12
	Wakefield	33,146	..	6	..	6	2	..	2	..	2	..
	Barnsley	35,427	..	4	..	4	1	..	2	..	2	1
	Sheffield	324,243	..	82	3	85	16	..	45	..	45	6
	Rotherham	42,061	..	19	..	19	4	..	11	..	11	1
	York	67,004	..	7	1	8	..	..	12	..	12	4
	Hull	200,044	..	38	9	47	10	..	19	3	22	5
	Scarborough	33,776	1	5	..	6	1	..	2	..	2	..
	Middlesbrough	75,532	..	24	..	24	4	..	16	1	17	6
X. Northern.	Darlington	38,060	..	6	1	7	1	..	3	1	4	..
	Stockton-on-Tees	49,705	..	17	..	17	2	..	7	..	7	..
	West Hartlepool	42,710	..	12	..	12	3	..	6	..	6	2
	Sunderland	131,015	..	32	7	39	11	..	23	1	24	3
	Jarrow	33,675	..	3	..	3	..	..	11	..	11	2
	South Shields	78,391	..	14	3	17	2	..	11	2	13	4
	Gateshead	85,692	..	56	1	57	6	..	21	..	21	4
	Newcastle-on-Tyne ..	186,300	..	43	3	46	10	..	22	5	27	8
	Tynemouth	46,588	..	5	..	5	1	..	5	..	5	2
	Carlisle..	39,176	..	5	..	5	..	..	2	..	2	1
XI. Welsh.	Newport (Mon.)	54,707	..	27	4	31	6	..	9	..	9	4
	Cardiff	128,915	..	34	..	34	3	..	14	1	15	4
	*Rhondda	88,351	..	36	4	40	8	..	43	2	45	4
	Merthyr Tydfil	58,080	..	16	..	16	1	..	16	..	16	4
	Swansea	90,349	..	33	..	33	1	..	22	..	22	2
	Totals, 93 Districts ..	13,095,255	66	2,691	117	2,874	511	27	1,888	82	1,997	377

* Formerly called Ystradyfodwg.

"FEVER."															Urban Sanitary Districts.
3rd Quarter.					4th Quarter.					Totals for 1897.					
Notifications.				Deaths.	Notifications.				Deaths.	Notifications.				Deaths.	
Typhus.	Enteric.	Continued.	Total.		Typhus.	Enteric.	Continued.	Total.		Typhus.	Enteric.	Continued.	Grand Total.		
..	11	..	11	3	..	37	1	38	8	..	67	2	69	18	Stockport.
..	3	..	3	..	..	22	..	22	..	..	39	..	39	4	Macclesfield.
..	10	..	10	..	..	8	..	8	4	..	48	..	48	5	Chester.
1	56	..	57	10	..	58	..	58	10	2	146	2	150	27	Birkenhead.
..	90	4	94	13	..	37	2	39	5	4	150	8	162	21	Bootle.
44	343	17	404	46	41	404	30	475	76	160	1,026	76	1,262	168	Liverpool.
..	74	..	74	13	..	37	..	37	11	..	146	..	146	31	St. Helens (Lancs.)
..	10	..	10	..	..	10	..	10	2	..	31	..	31	3	Southport.
..	9	..	9	3	..	20	..	20	3	1	61	..	62	11	Wigan.
..	21	1	22	..	..	13	..	13	4	..	42	1	43	5	Warrington.
..	34	1	35	8	..	45	..	45	12	..	122	1	123	25	Bolton.
..	21	4	25	3	..	17	3	20	6	..	58	11	69	17	Bury (Lancs.)
..	74	7	81	14	..	115	14	129	20	..	303	26	329	66	Salford.
..	117	..	117	17	..	212	..	212	40	3	492	..	495	100	Manchester.
..	8	1	9	..	..	25	3	28	6	..	60	8	68	17	Ashton-under-Lyne.
..	14	..	14	4	1	30	..	31	8	3	85	..	88	20	Oldham.
..	9	1	10	3	..	7	..	7	1	..	24	1	25	5	Rochdale.
..	12	..	12	..	..	26	..	26	3	..	52	..	52	5	Accrington.
..	33	..	33	8	..	24	..	24	5	..	98	..	98	19	Burnley.
..	30	..	30	6	..	86	..	86	12	1	182	..	183	38	Blackburn.
..	3	..	3	1	..	26	1	27	4	..	44	2	46	8	Darwen.
..	38	..	38	10	..	107	2	109	15	1	202	2	205	35	Preston.
..	11	1	12	3	..	6	5	11	3	..	50	17	67	8	Barrow-in-Furness.
..	16	..	16	2	..	22	..	22	4	..	64	2	66	13	Keighley.
..	14	..	14	1	..	36	..	36	10	1	64	..	65	15	Huddersfield.
..	15	..	15	4	..	28	..	28	4	..	77	1	78	16	Halifax.
..	40	1	41	5	..	62	..	62	12	..	148	1	149	31	Bradford.
1	163	..	164	16	..	205	7	212	41	1	469	13	483	80	Leeds.
..	14	..	14	2	..	5	1	6	..	..	27	1	28	4	Wakefield.
..	19	..	19	1	..	26	..	26	7	..	51	..	51	10	Barnsley.
..	295	4	299	42	..	272	7	279	46	..	694	14	708	110	Sheffield.
..	30	..	30	7	..	30	1	31	6	..	90	1	91	18	Rotherham.
..	53	2	55	9	..	31	..	31	6	..	103	3	106	19	York.
..	107	18	125	21	..	86	6	92	20	..	250	36	286	56	Hull.
..	8	..	8	2	..	8	..	8	2	1	23	..	24	5	Scarborough.
..	34	..	34	5	..	93	6	99	15	..	167	7	174	30	Middlesbrough.
..	13	..	13	1	..	12	..	12	2	..	34	2	36	4	Darlington.
..	21	5	26	1	..	21	3	24	4	..	66	8	74	7	Stockton-on-Tees.
..	5	..	5	4	..	21	1	22	2	..	44	1	45	11	West Hartlepool.
..	86	12	98	12	..	62	10	72	12	..	203	30	233	38	Sunderland.
..	13	..	13	2	..	12	..	12	1	..	39	..	39	5	Jarrow.
..	29	8	37	3	..	23	..	23	5	..	77	13	90	14	South Shields.
..	33	4	37	3	..	45	2	47	7	..	155	7	162	20	Gateshead.
..	34	2	36	5	..	39	1	40	11	..	138	11	149	34	Newcastle-on-Tyne.
..	11	..	11	3	..	9	..	9	3	..	30	..	30	9	Tynemouth.
..	6	..	6	1	..	5	..	5	1	..	18	..	18	3	Carlisle.
..	12	1	13	2	..	11	..	11	..	..	59	5	64	12	Newport (Mon.)
..	32	2	34	5	..	37	4	41	9	..	117	7	124	21	Cardiff.
..	76	3	79	9	..	52	2	54	6	..	207	11	218	27	Rhondda.
..	40	5	45	6	..	30	..	30	4	..	102	5	107	15	Merthyr Tydfil.
1	20	..	21	3	..	16	..	16	1	1	91	..	92	7	Swansea.
48	4,556	171	4,775	662	44	5,260	162	5,466	964	185	14,395	532	15,112	2,514	Totals, 93 Districts.

No. 12A.

TABLE showing, Week by Week, during the Year 1897, for each of the **SANITARY AREAS** within
NOTIFIED CASES of and **REGISTERED DEATHS** from the following **DISEASES**, together with

[The Cases are copied from the Weekly Returns of Notifiable Diseases received by the Board from the Metropolita

	Sanitary Areas.	Population (1891).	SMALL-POX.											
			Weekly Statement, 1st Quarter, 1897.											
			Jan. 9.		Jan. 16.		Jan. 23.		Jan. 30.		Feb. 6.		Feb. 13.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. (Administrative County)	4,232,118	3	..	1	..	..	1	4	..	8	..	23	2
W. District.	Kensington	166,308	..	..	..	..	..	..	..	..	..	..	..	..
	Fulham	91,639	..	..	..	..	..	..	..	..	..	..	..	..
	Hammersmith	97,239	..	..	..	..	..	..	..	..	..	..	..	..
	Paddington	117,846	..	..	..	..	..	..	..	..	..	..	..	..
	Chelsea..	96,253	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Hanover Sq.*..	78,599	..	..	..	..	..	..	..	..	..	..	..	..
	Westminster	55,539	..	..	..	..	..	..	..	..	..	..	..	..
	St. James, Westminster ..	24,995	..	..	..	..	..	..	..	..	..	..	..	..
N. District.	St. Marylebone	142,404	1	..	..	..	..	..	..	..	..	..	..	..
	Hampstead	68,416	..	..	..	..	..	..	..	..	..	..	..	..
	St. Pancras	234,379	..	..	..	..	..	..	..	..	1	..	..	..
	Islington	319,143	..	..	..	..	..	..	..	..	..	..	..	..
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..	..	..	..	..	1	..
	Hackney	198,606	..	..	..	..	..	..	..	..	..	..	..	..
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	..	..	..	2	..	1	..	..	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	1	..	..	..	..	..
	Strand†..	25,217	..	..	..	..	..	..	..	..	..	..	1	..
	Holborn‡	34,043	..	..	..	..	..	..	..	..	..	..	..	..
	Clerkenwell	66,216	..	..	..	..	..	..	..	..	..	..	..	..
	St. Luke, Middlesex ..	42,440	..	..	..	..	..	..	..	..	..	..	..	..
	London, City of§	37,583	..	..	..	..	..	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	..	..	..	..	..	..	..	..	..	..	..	..
	Bethnal Green	129,132	..	..	..	..	..	..	..	..	..	..	..	..
	Whitechapel‖	74,420	..	..	..	..	..	..	..	..	..	..	..	..
	St. George-in-the East ..	45,795	..	..	..	..	..	..	..	..	..	..	..	..
	Limehouse	57,376	..	..	..	..	..	..	..	..	..	..	..	..
	Mile End Old Town ..	107,592	..	..	..	..	..	..	..	..	..	..	..	..
	Poplar	166,748	1	..	..	..	..	..	..	..	..	..	1	..
S. District.	St. Saviour, Southwark ..	27,177	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Southwark ..	59,712	..	..	..	..	..	..	..	..	..	..	..	..
	Newington	115,804	..	..	..	..	..	..	..	..	..	..	..	..
	St. Olave, Southwark ..	12,723	..	..	..	..	..	..	..	..	..	..	..	..
	Bermondsey	84,682	..	..	..	..	..	..	..	..	..	..	1	..
	Rotherhithe	39,255	..	..	..	..	..	..	..	..	..	..	..	..
	Lambeth	275,203	..	..	..	..	..	..	..	..	1	..	..	..
	Battersea	150,558	..	..	..	..	..	..	..	..	..	..	..	..
	Wandsworth	156,942	..	..	..	..	..	..	..	..	..	..	..	..
	Camberwell	235,344	..	..	..	..	..	..	1	..	5	..	16	1
	Greenwich	165,413	..	..	1	..	..	1	..	..	..	..	..	1
	Lewisham	92,647	..	..	..	..	..	..	..	..	..	..	..	..
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	..	..
	Plumstead	52,436	..	..	..	..	..	..	..	..	..	..	..	..
	Lee	36,103	..	..	..	..	..	..	..	..	..	..	..	..
	Port of London	..	1	..	..	..	..	..	..	..	..	..	3	..

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* Including St. Peter's, Westminster (population, 235). † Including Middle Temple (population, 9

‡ *Including Gray's* Inn (population, 253), Lincoln's Inn (population, 2/), Charterhouse (population
Staple Inn (population, 21), and Furnival's Inn (population, 121).

No. 12A.

the Administrative County of London and for the County as a Whole, the Number of Quarterly and Annual Summaries of these Data for each of the Areas in question.

Asylums Board. The Deaths are extracted from the Weekly Returns compiled by the Registrar-General.]

SMALL-POX—*continued.*																
Weekly Statement, 1st Quarter, 1897—*continued.*														Totals for 1st Quarter. 1897.		Sanitary Areas.
Feb. 20.		Feb. 27.		Mar. 6.		Mar. 13.		Mar. 20.		Mar. 27.		April 3.				
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
3	1	14	1	..	6	2	1	1	..	2	..	3	..	64	12	London. (*Administrative County.*)
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Kensington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Fulham.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hammersmith.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Paddington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Chelsea.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George, Hanover Sq.*
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. James, Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. Marylebone.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hampstead.
..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1	St. Pancras.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Islington.
..	..	1	..	..	..	..	..	..	..	..	..	..	..	2	..	St. Mary, Stoke Newington.
..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	Hackney.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	St. Giles and St. George Bloomsbury.
..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	1	St. Martin-in-the-Fields.
..	..	5	..	..	2	..	..	..	..	..	..	2	..	8	2	Strand.†
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Holborn.‡
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Clerkenwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Luke, Middlesex.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	London, City of.§
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Shoreditch.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Bethnal Green.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Whitechapel.‖
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George-in-the-East.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Limehouse.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Mile End Old Town.
..	..	..	..	..	..	..	..	1	..	..	..	1	..	4	..	Poplar.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Saviour, Southwark.
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	St. George, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Newington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Olave, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Bermondsey.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Rotherhithe.
1	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	Lambeth.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Battersea.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Wandsworth.
2	..	6	1	..	3	1	..	..	..	..	..	..	..	31	5	Camberwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	Greenwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lewisham.
..	..	..	..	..	..	..	..	..	..	2	..	..	..	2	..	Woolwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Plumstead.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lee.
..	..	2	..	..	..	..	..	..	..	..	..	..	..	6	..	Port of London.

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§ Including Inner Temple (population, 96).

‖ Including Tower of London (population, 868)

	Sanitary Areas.	Population (1891).	SMALL-POX—*continued.*											
			Weekly Statement, 2nd Quarter, 1897.											
			April 10.		April 17.		April 24.		May 1.		May 8.		May 15.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. *(Administrative County)*	4,232,118	2	..	1	..	3	..	5	..	3	..	5	..
W. District.	Kensington	166,308	..	..	..	..	..	..	..	..	..	..	..	..
	Fulham	91,639	..	..	..	..	..	..	..	..	..	..	..	..
	Hammersmith	97,239	..	..	..	..	..	..	..	..	..	..	..	..
	Paddington	117,846	..	..	..	..	..	..	..	..	..	..	..	..
	Chelsea	96,253	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Hanover Sq.* ..	78,599	..	..	..	..	..	..	..	..	..	..	..	..
	Westminster	55,539	..	..	..	..	..	..	..	..	..	..	..	..
	St. James, Westminster ..	24,995	..	..	..	..	..	..	..	..	..	..	3	..
N. District.	St. Marylebone	142,404	..	..	..	..	..	..	..	..	..	..	2	..
	Hampstead	68,416	..	..	..	..	..	..	..	..	..	..	..	..
	St. Pancras	234 379	..	..	..	..	..	..	..	..	..	..	..	..
	Islington	319,143	..	..	..	..	..	..	1	..	1	..	..	..
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..	..	..	..	..	..	..
	Hackney	198,606	1	..	..	..	..	..	..	..	..	..	..	..
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	..	..	..	..	..	..	..	..	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	..	..	..	..
	Strand†	25,217	..	..	..	..	..	..	..	..	..	..	..	..
	Holborn‡	34,043	..	..	..	..	..	..	..	..	..	..	..	..
	Clerkenwell	66,216	..	..	..	..	..	..	..	..	..	..	..	..
	St. Luke, Middlesex ..	42,440	..	..	..	..	..	..	..	..	..	..	..	..
	London, City of§	37,583	..	..	..	..	..	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	..	..	..	..	..	..	..	..	..	..	..	..
	Bethnal Green	129,132	..	..	..	..	..	..	..	..	..	..	..	..
	Whitechapel‖	74,420	..	..	..	..	..	..	..	..	..	..	..	..
	St. George-in-the-East ..	45,795	..	..	..	..	1	..	..	..	..	..	..	..
	Limehouse	57,376	..	..	..	..	..	..	..	..	..	..	..	..
	Mile End Old Town ..	107,592	..	..	..	..	..	..	..	..	..	..	..	..
	Poplar	166,748	..	..	1	..	..	..	3	..	..	..	..	..
S. District.	St. Saviour, Southwark ..	27,177	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Southwark ..	59,712	..	..	..	..	..	..	..	..	..	..	..	..
	Newington	115,804	..	..	..	..	..	..	..	..	..	..	..	..
	St. Olave, Southwark ..	12,723	..	..	..	..	..	..	..	..	..	..	..	..
	Bermondsey	84,682	..	..	..	..	..	..	..	..	..	..	..	..
	Rotherhithe	39,255	..	..	..	..	..	..	..	..	..	..	..	..
	Lambeth	275,203	..	..	..	..	..	..	..	..	..	..	..	..
	Battersea	150,558	..	..	..	..	1	..	..	..	1	..	..	..
	Wandsworth	156,942	..	..	..	..	..	..	..	..	1	..	..	..
	Camberwell	235,344	..	..	..	..	1	..	..	..	..	..	..	..
	Greenwich	165,413	..	..	..	..	..	..	..	..	..	..	..	..
	Lewisham	92,647	..	..	..	..	..	..	..	..	..	..	..	..
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	..	..
	Plumstead	52,436	..	..	..	..	..	..	..	..	..	..	..	..
	Lee	36,103	..	..	..	..	..	..	..	..	..	..	..	..
	Port of London	..	1	..	..	..	..	..	1	..	..	..	..	..

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population, 95).
‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136), Staple Inn (population, 21), and Furnival's Inn (population, 121).

SMALL-POX—*continued.*

Weekly Statement, 2nd Quarter, 1897—*continued.*														Totals for 2nd Quarter, 1897.		Sanitary Areas.
ay 22.		May 29.		June 5.		June 12.		June 19.		June 26.		July 3.				
	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
2	1	..	..	..	..	1	1	2	..	2	..	..	..	26	2	London. (*Administrative County.*)
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Kensington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Fulham.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hammersmith.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Paddington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Chelsea.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George, Hanover Sq.*
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	St. James, Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	St. Marylebone.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hampstead.
	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Pancras.
	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	Islington.
	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St.Mary,StokeNewington.
	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Hackney.
	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Giles and St. George Bloomsbury.
	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Martin-in-the Fields.
	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Strand.†
	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Holborn.‡
	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	Clerkenwell.
	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Luke, Middlesex.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	London, City of.§
1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1	Shoreditch.
..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	Bethnal Green.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Whitechapel.‖
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. George-in-the-East.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Limehouse.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Mile End Old Town.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	Poplar.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Saviour, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Newington.
1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. Olave, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Bermondsey.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Rotherhithe.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lambeth.
..	..	..	..	..	..	1	..	1	..	..	..	..	..	4	..	Battersea.
..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	Wandsworth.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Camberwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Greenwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lewisham.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Woolwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Plumstead.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lee.
..	..	..	..	..	..	..	..	..	..	1	..	..	..	3	..	Port of London.

Including Inner Temple (population, 96).

Including Tower of London (population, 863).

SMALL-POX—*continued.*

	Sanitary Areas.	Population (1891).	Weekly Statement, 3rd Quarter, 1897.											
			July 10.		July 17.		July 24.		July 31.		Aug. 7.		Aug. 14.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. (*Administrative County*)	4,232,118	3	..	1	..	..	..	3	1	..	1	..	..
W. District.	Kensington	166,308	..	..	..	..	..	..	..	..	..	..	..	
	Fulham	91,639	..	..	..	..	..	..	..	..	..	..	..	
	Hammersmith	97,239	..	..	..	..	..	..	..	..	..	..	..	
	Paddington	117,846	1	..	..	..	..	..	..	..	..	..	..	
	Chelsea	96,253	..	..	..	..	..	..	..	..	..	..	..	
	St. George, Hanover Sq.* ..	78,599	..	..	1	..	..	..	..	..	..	..	..	
	Westminster	55,539	..	..	..	..	..	..	..	..	..	..	..	
	St. James, Westminster ..	24,995	..	..	..	..	..	..	..	..	..	..	..	
N. District.	St. Marylebone	142,404	1	..	..	..	..	..	..	..	..	..	..	
	Hampstead	68,416	..	..	..	..	..	..	..	..	..	..	..	
	St. Pancras	234,379	..	..	..	..	..	..	..	..	..	..	..	
	Islington	319,143	..	..	..	..	..	..	1	..	..	1	..	
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..	..	..	..	..	..	
	Hackney	198,606	1	..	..	..	..	..	..	..	..	..	..	
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	..	..	..	..	..	..	..	..	
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	.	..	..	..	..	
	Strand†	25,217	..	..	..	..	..	..	..	..	..	..	..	
	Holborn‡	34,043	..	..	..	..	..	..	..	..	..	..	..	
	Clerkenwell	66,216	..	..	..	..	..	..	..	..	..	..	..	
	St. Luke, Middlesex ..	42,440	..	..	..	..	..	..	..	..	..	..	..	
	London, City of§	37,583	..	..	..	..	..	..	2	1	..	..	..	
E. District.	Shoreditch	124,009	..	..	..	..	..	..	..	..	..	..	..	
	Bethnal Green	129,132	..	..	..	..	..	..	..	..	..	..	..	
	Whitechapel‖	74,420	..	..	..	..	..	..	..	..	..	..	..	
	St. George-in-the-East ..	45,795	..	..	..	..	..	..	..	..	..	..	..	
	Limehouse	57,376	..	..	..	..	..	..	..	..	..	..	..	
	Mile End Old Town ..	107,592	..	..	..	..	..	..	..	..	..	..	..	
	Poplar	166,748	..	..	..	..	..	..	..	..	..	..	..	
S. District.	St. Saviour, Southwark ..	27,177	..	..	..	..	..	..	..	..	..	..	.	
	St. George, Southwark ..	59,712	..	..	..	..	..	..	..	..	..	..	..	
	Newington	115,804	..	..	..	..	..	..	..	..	..	..	..	
	St. Olave, Southwark ..	12,723	..	..	..	..	..	..	..	..	..	..	..	
	Bermondsey	84,682	..	..	..	..	..	..	..	..	..	..	..	
	Rotherhithe	39,255	..	..	..	..	..	..	..	..	..	..	..	
	Lambeth	275,203	..	..	..	..	..	..	..	..	..	..	..	
	Battersea	150,558	..	..	..	..	..	..	..	..	..	..	..	
	Wandsworth	156,942	..	..	..	..	..	..	..	..	..	..	..	
	Camberwell	235,344	..	..	..	..	..	..	..	..	..	..	..	
	Greenwich	165,413	..	..	..	..	..	..	..	..	..	..	..	
	Lewisham	92,647	..	..	..	..	..	..	..	..	..	..	..	
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	..	
	Plumstead	52,436	..	..	..	..	..	..	..	..	..	..	..	
	Lee	36,103	..	..	..	..	..	..	..	..	..	..	..	
	Port of London	..	..	..	..	..	..	..	..	..	..	..	..	

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population,

‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 1 Staple Inn (population, 21), and Furnival's Inn (population, 121).

SMALL-POX—*continued.*															
Weekly Statement, 3rd Quarter, 1897.													Totals for 3rd Quarter 1897.		Sanitary Areas.
g. 21.	Aug. 28.		Sept. 4.		Sept. 11.		Sept. 18.		Sept. 25.		Oct. 2.				
Deaths.	Cases.	Deaths.	Cases	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
..	1	..	..	..	..	..	1	..	..	..	..	..	9	2	London. (*Administrative County.*)
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Kensington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Fulham.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hammersmith.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Paddington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Chelsea.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. George, Hanover Sq.*
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. James, Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. Marylebone.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hampstead.
..	1	..	..	..	..	..	1	..	..	..	..	..	2	..	St. Pancras.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	Islington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St.Mary,StokeNewington.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Hackney.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Martin-in-the-Fields.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Strand.†
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Holborn.‡
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Clerkenwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Luke, Middlesex.
..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	London, City of.§
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Shoreditch.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Bethnal Green.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Whitechapel.‖
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George-in-the-East.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Limehouse.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Mile End Old Town.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Poplar.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Saviour, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Newington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Olave, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Bermondsey.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Rotherhithe.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lambeth.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Battersea.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Wandsworth.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Camberwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Greenwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lewisham.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Woolwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Plumstead.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lee.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Port of London.

uding Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

SMALL-POX—*continued.*

Weekly Statement, 4th Quarter, 1897.

	Sanitary Areas.	Population (1891).	Oct. 9.		Oct. 16.		Oct. 23.		Oct. 30.		Nov. 6.		Nov. 13.		Nov.
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.
	London .. .. (*Administrative County*)	4,232,118	..	..	..	..	1	..	1	..	..	..	2	..	1
W. District.	Kensington	166,308	..	..	..	..	..	..	..	..	..	..	..	..	..
	Fulham	91,639	..	..	..	..	..	..	..	..	..	..	..	..	..
	Hammersmith	97,239	..	..	..	..	..	..	..	..	..	..	..	..	..
	Paddington	117,846	..	..	..	..	..	..	..	..	..	..	..	..	..
	Chelsea..	96,253	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Hanover Sq.* ..	78,590	..	..	..	..	..	..	..	..	..	..	..	..	..
	Westminster	55,539	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. James, Westminster ..	24,995	..	..	..	..	..	..	..	..	..	..	..	..	..
N. District.	St. Marylebone	142,404	..	..	..	..	..	..	..	..	..	..	..	..	..
	Hampstead	68,416	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. Pancras	234,379	..	..	..	..	..	..	..	..	..	..	..	..	..
	Islington	319,143	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..	..	..	..	..	..	..	..
	Hackney	198,606	..	..	..	..	..	..	..	..	..	..	..	..	..
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	..	..	..	..	..
	Strand†	25,217	..	..	..	..	..	..	..	..	..	..	..	..	..
	Holborn‡	34,043	..	..	..	..	..	..	..	..	..	..	..	..	..
	Clerkenwell	66,216	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. Luke, Middlesex ..	42,440	..	..	..	..	..	..	..	..	..	..	..	..	..
	London, City of§	37,583	..	..	..	..	..	..	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	..	..	..	..	..	..	..	..	..	..	..	..	..
	Bethnal Green	129,132	..	..	..	..	1	..	..	..	..	..	..	..	..
	Whitechapel‖	74,420	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. George-in-the-East ..	45,795	.	..	..	..	..	..	..	..	..	..	..	..	..
	Limehouse	57,376	..	..	..	..	..	..	..	..	..	..	..	..	..
	Mile End Old Town ..	107,592	..	..	..	..	..	..	..	..	..	..	..	..	..
	Poplar	166,748	..	..	..	..	..	..	..	..	..	..	..	..	1
S. District.	St. Saviour, Southwark ..	27,177	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Southwark ..	59,712	..	..	..	..	..	..	..	..	..	..	..	..	..
	Newington	115,804	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. Olave, Southwark ..	12,723	..	..	..	..	..	..	..	..	..	..	..	..	..
	Bermondsey	84,682	..	..	..	..	..	..	..	..	..	..	..	..	..
	Rotherhithe	39,255	..	..	..	..	..	..	..	..	..	..	..	..	..
	Lambeth	275,203	..	..	..	..	..	..	..	..	..	..	..	..	..
	Battersea	150,558	..	..	..	..	..	..	..	..	..	..	1	..	..
	Wandsworth..	156,942	..	..	..	..	..	..	..	..	..	..	..	..	..
	Camberwell	235,344	..	..	..	..	..	..	..	..	..	..	..	..	..
	Greenwich	165,413	..	..	..	..	..	..	..	..	..	..	..	..	..
	Lewisham	92,647	..	..	..	..	..	..	..	..	..	..	..	..	..
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	..	..	..
	Plumstead	52,436	..	..	..	..	..	..	..	..	..	..	..	..	..
	Lee	36,103	..	..	..	..	..	..	1	..	..	..	..	..	..
	Port of London	..	..	..	..	..	..	..	..	..	..	..	1	..	..

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population, 9
‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 1
Staple Inn (population, 21), and Furnival's Inn (population, 121).

SMALL-POX—*continued.*

Weekly Statement, 4th Quarter, 1897—*continued.*											Totals for 4th Quarter, 1897.		Grand Totals for Year 1897.		Sanitary Areas.*
ov. 27.	Dec. 4.		Dec. 11.		Dec. 18.		Dec. 25.		Jan. 1, 1898.						
Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
..	..	..	..	..	..	..	..	..	1	..	6	..	105	..	London.
															(*Administrative County.*)
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Kensington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Fulham.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hammersmith.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Paddington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Chelsea.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. George, Hanover Sq.*
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	St. James, Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	St. Marylebone.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hampstead.
..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	St. Pancras.
..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	Islington.
..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	St Mary,StokeNewington.
..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	Hackney.
..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. Martin-in-the-Fields.
..	..	..	..	..	..	..	..	..	..	..	..	..	8	..	Strand.†
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Holborn.‡
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Clerkenwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Luke, Middlesex.
..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	London, City of.§
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Shoreditch.
..	..	..	..	..	..	..	..	..	..	..	1	..	2	..	Bethnal Green.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Whitechapel.‖
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. George-in-the-East.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Limehouse.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Mile End Old Town.
..	..	..	..	..	..	..	..	..	..	..	1	..	9	..	Poplar.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Saviour, Southwark.
..	..	..	..	..	..	..	..	..	1	..	1	..	1	..	St. George, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Newington.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. Olave, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Bermondsey.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Rotherhithe.
..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	Lambeth.
..	..	..	..	..	..	..	..	..	..	..	1	..	5	..	Battersea.
..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	Wandsworth.
..	..	..	..	..	..	..	..	..	..	..	..	..	32	..	Camberwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Greenwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lewisham.
..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	Woolwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Plumstead.
..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	Lee.
..	..	..	..	..	..	..	..	..	..	..	1	..	10	..	Port of London.

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ing Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

	Sanitary Areas.	Population (1891).	SCARLET FEVER.											
			Weekly Statement, 1st Quarter, 1897.											
			Jan. 9.		Jan. 16.		Jan. 23.		Jan. 30.		Feb. 6.		Feb. 13.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. *(Administrative County.)*	4,232,118	402	21	324	15	372	14	341	13	336	14	316	17
W. District.	Kensington	166,368	12	..	7	..	11	..	14	1	13	2	5	..
	Fulham	91,639	5	..	11	..	15	..	19	..	7	1	8	1
	Hammersmith	97,239	6	1	7	..	7	1	8	1	5	..	4	..
	Paddington	117,846	8	2	8	..	7	2	12	1	13	..	5	..
	Chelsea	96,253	7	1	6	2	6	..	5	1	6	..	7	..
	St. George, Hanover Sq.* ..	78,599	6	..	..	..	5	1	4	..	2	..	4	..
	Westminster	55,539	4	..	6	1	1	..	5	1	3	1	..	..
	St. James, Westminster ..	24,995	1	..	..	1	..	..	..	..	3	..	..	..
N. District.	St. Marylebone	142,464	8	..	5	..	5	..	4	..	4	..	8	..
	Hampstead	68,416	5	..	6	..	6	..	3	..	4	..	2	..
	St. Pancras	234,379	27	1	12	1	11	1	13	..	13	1	9	..
	Islington	319,143	34	2	39	2	29	1	18	1	20	..	21	1
	St. Mary, Stoke Newington	30,936	4	..	..	..	6	..	2	..	2	..	1	..
	Hackney	198,606	31	1	19	1	28	1	23	1	19	..	34	2
Central District.	St. Giles and St. George, Bloomsbury.	39,782	2	..	5	..	6	..	8	..	5	..	2	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	4	..	..	..	..	..	..	..
	Strand†	25,217	1	..	..	..	4	..	..	..	2	..	1	..
	Holborn‡	34,043	3	1	4	..	2	..	2	1	1	..	3	..
	Clerkenwell	66,216	5	..	6	..	10	1	8	..	4	..	4	..
	St. Luke, Middlesex ..	42,440	2	..	5	..	6	..	3	..	2	..	2	1
	London, City of§	37,583	..	..	..	..	2	1	..	..	..	..	..	..
E. District.	Shoreditch	124,009	14	1	13	3	12	..	10	..	11	1	6	..
	Bethnal Green	129,132	14	..	9	..	10	..	10	..	12	..	7	2
	Whitechapel‖	74,420	8	..	2	1	5	..	9	..	3	1	5	..
	St. George-in-the-East ..	45,795	4	..	2	..	2	1	1	..	4	..	3	..
	Limehouse	57,376	12	..	8	..	4	..	4	..	5	..	3	..
	Mile End Old Town ..	107,592	10	..	7	..	12	..	21	..	8	..	6	..
	Poplar	166,748	19	2	16	..	17	..	13	..	13	1	10	3
S. District.	St. Saviour, Southwark ..	27,177	4	..	2	..	1	..	5	..	2	..	1	..
	St. George, Southwark ..	59.712	9	2	3	..	1	..	3	..	6	..	6	..
	Newington	115,804	8	1	8	..	11	1	3	..	7	..	9	..
	St. Olave, Southwark ..	12,723	..	..	..	..	3	..	2	..	2	..	1	..
	Bermondsey	84,682	9	..	4	..	7	1	12	..	6	..	4	1
	Rotherhithe	39,255	1	1	2	..	4	..	4	..	..	..	..	..
	Lambeth	275,203	19	1	19	1	29	..	18	2	22	1	30	1
	Battersea	150,558	16	1	12	..	24	..	13	1	23	2	33	..
	Wandsworth..	156,942	33	1	25	1	16	1	17	1	21	2	16	2
	Camberwell	235,344	21	..	17	..	22	..	17	1	22	1	18	2
	Greenwich	165,413	15	1	21	..	14	1	21	..	18	..	18	1
	Lewisham	92,647	6	1	4	1	3	..	3	..	8	..	8	..
	Woolwich	40,818	4	..	1	..	..	..	1	..	4	..	1	..
	Plumstead	52,436	3	..	..	..	3	..	1	..	8	..	4	..
	Lee	36,103	2	..	3	..	1	..	2	..	3	..	7	..
	Port of London	..	..	..	..	..	..	..	..	..	..	..	..	..

Including St. Peters, Westminster (population, 235).

† Including Middle Temple (population, 95).

SCARLET FEVER—*continued.*

Weekly Statement, 1st Quarter, 1897—*continued.*														Totals for 1st Quarter, 1897.		Sanitary Areas.
Feb. 20.		Feb. 27.		Mar. 6.		Mar. 13.		Mar. 20.		Mar. 27.		April 3.				
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
313	11	324	10	271	8	298	13	303	7	302	13	299	10	4,201	166	London. *(Administrative County.)*
6	..	5	..	11	..	11	..	8	..	11	..	3	1	117	4	Kensington.
7	1	6	..	8	1	6	..	3	..	3	..	7	..	105	4	Fulham.
9	..	9	1	5	..	7	1	9	..	9	..	4	..	89	5	Hammersmith.
7	..	10	..	4	..	5	..	8	..	6	..	4	..	97	5	Paddington.
5	1	9	..	12	..	11	..	9	1	11	1	4	..	98	7	Chelsea.
2	..	4	..	2	1	2	..	3	..	2	..	5	..	41	2	St. George, Hanover Sq.*
2	..	3	..	5	..	..	..	3	..	5	..	4	1	41	4	Westminster.
..	..	1	..	..	..	1	..	2	..	1	..	..	..	9	1	St. James, Westminster.
3	..	2	..	7	..	3	..	8	..	3	..	..	..	60	..	St. Marylebone.
4	..	5	..	4	..	..	..	2	..	2	..	2	..	45	..	Hampstead.
14	1	13	1	8	..	11	1	14	..	18	1	10	..	173	8	St. Pancras.
27	..	23	3	22	1	31	2	28	2	19	2	15	1	326	18	Islington.
1	..	3	..	4	..	1	..	..	..	3	..	4	..	31	..	St.Mary,StokeNewington.
14	2	20	..	17	2	16	1	11	1	25	1	14	1	271	14	Hackney.
6	..	4	1	1	..	4	..	1	..	2	..	4	..	50	1	St. Giles and St. George, Bloomsbury.
..	..	1	..	..	..	1	..	1	..	..	..	1	..	8	..	St. Martin-in-the-Fields.
..	..	..	..	1	..	..	1	..	..	3	..	2	..	14	1	Strand.†
2	..	1	..	3	..	2	..	1	..	3	..	4	..	31	2	Holborn.‡
2	..	1	..	7	1	5	..	3	..	..	..	1	..	56	2	Clerkenwell.
3	..	1	..	..	..	2	..	..	..	1	..	2	..	29	1	St. Luke, Middlesex.
1	..	2	..	..	..	1	..	4	..	..	1	4	1	14	3	London, City of.§
8	1	8	..	7	..	10	..	8	..	6	..	6	..	119	6	Shoreditch.
11	..	6	..	5	..	11	..	9	1	13	..	13	..	130	3	Bethnal Green.
9	..	6	1	8	..	4	..	6	..	4	..	5	..	74	3	Whitechapel.‖
1	1	1	..	..	..	4	..	1	..	2	1	1	..	26	3	St. George-in-the-East.
5	..	3	..	5	..	5	1	4	..	2	..	7	..	67	1	Limehouse.
5	1	9	..	10	..	11	..	9	..	7	..	15	..	130	1	Mile End Old Town.
12	..	13	..	11	..	13	..	15	..	18	..	14	..	184	6	Poplar.
..	..	..	..	2	..	4	..	2	1	1	..	4	1	28	2	St. Saviour, Southwark.
5	..	1	..	3	..	9	..	3	..	2	..	5	..	56	2	St. George, Southwark.
9	..	18	..	12	..	7	1	13	..	1	1	11	2	117	6	Newington.
1	..	1	..	..	..	..	..	..	..	..	..	4	..	14	..	St. Olave, Southwark.
5	..	5	..	6	..	4	..	10	1	5	1	9	..	86	4	Bermondsey.
2	..	4	..	1	..	..	..	2	..	2	..	3	..	25	1	Rotherhithe.
20	..	25	2	20	1	14	1	20	..	21	..	22	1	279	11	Lambeth.
18	1	19	..	16	..	22	3	22	..	23	1	15	1	256	10	Battersea.
15	2	25	..	9	..	17	..	21	..	16	..	15	..	246	10	Wandsworth.
19	..	25	1	11	..	19	..	15	..	24	1	25	..	255	6	Camberwell.
28	..	19	..	8	..	10	..	9	..	18	2	22	..	221	5	Greenwich.
6	..	6	..	7	1	7	..	4	..	4	..	4	..	70	3	Lewisham.
5	..	..	..	1	..	..	..	1	..	2	..	1	..	21	..	Woolwich.
9	..	1	..	2	..	6	1	8	..	4	..	4	..	53	1	Plumstead.
5	..	4	..	2	..	..	..	3	..	..	..	..	..	32	..	Lee.
..	..	2	..	4	..	1	..	..	..	..	..	..	.	7	..	Port of London.

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ncluding Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136), Staple population, 21), and Furnival's Inn (population, 121).

ncluding Inner Temple (population, 96). ‖ Including Tower of London (population, 868).

	Sanitary Areas.	Population (1891).	SCARLET FEVER—*continued.*											
			Weekly Statement, 3rd Quarter, 1897.											
			July 10.		July 17.		July 24.		July 31.		Aug. 7.		Aug. 14.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. *(Administrative County)*	4,232,118	428	18	512	13	573	19	510	18	490	12	446	16
W. District.	Kensington	166,208	15	..	18	1	10	..	16	..	10	..	16	..
	Fulham	91,639	6	1	15	..	43	1	28	1	26	..	22	..
	Hammersmith	97,239	4	..	5	..	11	..	3	..	5	..	4	..
	Paddington	117,846	13	..	13	1	18	1	3	2	5	..	6	..
	Chelsea	96,253	9	..	13	1	17	..	5	..	11	..	17	..
	St. George, Hanover Sq.* ..	78,599	2	..	..	..	5	..	2	..	6	..	3	1
	Westminster	55,539	2	..	4	..	10	..	3	1	4	..	6	1
	St. James, Westminster ..	24,995	6	..	5	1	3	..	8	..	4	..	7	..
N. District.	St. Marylebone	142,404	9	..	12	..	6	..	7	1	12	..	6	1
	Hampstead	68,416	4	..	9	..	5	2	3	..	2	..	4	1
	St. Pancras	234,379	14	..	26	..	27	..	21	2	19	..	19	..
	Islington	319,143	31	..	23	1	35	..	28	2	26	2	32	3
	St. Mary, Stoke Newington	30,936	3	..	2	..	6	..	2	..	3	..	1	..
	Hackney	198,606	24	2	21	1	15	1	28	..	24	1	34	1
Central District.	St. Giles and St. George, Bloomsbury.	39,782	2	1	9	1	6	1	7	..	4	..	3	..
	St. Martin-in-the-Fields ..	14,616	..	..	1	..	..	..	2	..	3	..	..	..
	Strand†	25,217	3	..	7	..	9	..	6	..	5	..	2	..
	Holborn‡	34,043	1	1	1	..	5	..	2	..	4	..	3	..
	Clerkenwell	66,216	5	..	24	..	16	..	17	..	10	1	8	..
	St. Luke, Middlesex ..	42,440	5	2	7	..	7	1	6	..	13	..	5	1
	London, City of§	37,583	1	1	1	..	1	..	2	..	2	..	2	..
E. District.	Shoreditch	124,009	16	..	12	..	15	1	12	1	11	1	12	2
	Bethnal Green	129,132	18	..	16	..	16	..	16	2	16	1	20	..
	Whitechapel‖	74,420	21	..	21	..	19	1	21	..	10	..	15	1
	St. George-in-the-East ..	45,795	6	..	1	..	13	..	5	..	6	..	1	..
	Limehouse	57,376	7	..	9	..	10	..	8	1	16	..	6	..
	Mile End Old Town ..	107,592	18	..	39	..	18	..	20	..	18	..	18	..
	Poplar	166,748	25	..	19	..	24	..	27	..	20	..	19	..
S. District.	St. Saviour, Southwark ..	27,177	6	..	3	..	4	1	5	1	2	..	5	..
	St. George, Southwark ..	59,712	5	..	8	1	8	..	7	..	9	..	9	..
	Newington	115,804	19	2	12	1	17	1	23	..	22	..	9	1
	St. Olave, Southwark ..	12,723	..	..	2	..	2	..	4	..	1	..	2	..
	Bermondsey	84,682	4	1	4	..	12	..	6	..	10	1	6	..
	Rotherhithe	39,255	9	1	3	1	7	..	10	..	8	..	8	..
	Lambeth	275,203	11	3	20	2	38	5	30	..	22	..	19	..
	Battersea	150,558	39	3	21	..	33	..	24	..	30	3	27	1
	Wandsworth	156,942	21	..	28	..	21	1	24	1	22	..	29	..
	Camberwell	235,344	17	..	35	..	25	..	19	1	22	..	22	1
	Greenwich	165,413	10	..	19	1	16	1	19	2	14	..	13	..
	Lewisham	92,647	6	..	9	..	4	1	4	..	6	..	1	..
	Woolwich	40,848	4	..	7	..	8	..	14	..	13	2	1	..
	Plumstead	52,436	4	..	4	..	..	..	6	..	6	..	3	..
	Lee	36,103	3	..	3	..	8	..	7	..	8	..	1	1
	Port of London	..	..	..	1	..	..	..	..	..	..	..	..	..

* Including St Peters, Westminster (population, 235). † Including Middle Temple (population, [illegible]).
‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, [illegible]), Staple Inn (population, 21), and Furnival's Inn (population, 121).

SCARLET FEVER—*continued.*

Weekly Statement, 3rd Quarter, 1897—*continued.*

Aug. 21.		Aug. 28.		Sept. 4.		Sept. 11.		Sept. 18.		Sept. 25.		Oct. 2.		Totals for 3rd Quarter, 1897.		Sanitary Areas.
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
440	19	429	15	515	11	531	10	608	26	737	19	770	19	6989	215	London. (*Administrative County.*)
11	..	10	..	19	1	14	..	25	..	36	..	48	1	248	3	Kensington.
12	..	10	..	25	2	20	..	27	3	21	..	17	..	272	8	Fulham.
10	..	10	..	8	..	8	..	4	..	14	..	17	2	103	2	Hammersmith.
9	..	4	2	9	..	7	1	14	1	16	..	15	1	132	9	Paddington.
8	1	10	..	12	..	9	..	7	1	13	..	14	..	145	3	Chelsea.
2	..	..	..	2	..	4	..	9	..	4	..	6	1	45	2	St. George, Hanover Sq.*
4	..	5	2	10	..	3	..	3	..	2	..	10	..	66	4	Westminster.
1	..	7	..	2	..	4	..	5	..	6	1	6	..	64	2	St. James, Westminster.
14	..	5	..	5	..	6	..	9	..	8	..	14	..	113	2	St. Marylebone.
..	..	5	1	2	1	1	..	5	..	3	..	5	..	48	5	Hampstead.
19	..	18	..	26	..	30	1	21	..	21	..	23	..	284	3	St. Pancras.
25	1	28	1	29	1	33	1	57	2	56	..	67	1	470	15	Islington.
2	..	2	..	1	..	2	..	1	..	..	..	7	..	32	..	St.Mary,StokeNewington.
39	..	24	..	43	..	39	..	35	..	62	1	35	..	423	7	Hackney.
3	..	7	..	7	..	8	..	2	..	2	..	9	..	69	3	St. Giles and St. George, Bloomsbury.
1	1	1	..	1	..	2	..	..	..	..	..	1	..	12	1	St. Martin-in-the-Fields.
1	1	..	..	4	..	4	..	12	..	1	..	5	..	59	1	Strand.†
4	..	2	..	4	..	2	..	1	..	3	..	1	..	33	1	Holborn.‡
7	..	5	..	7	1	17	1	10	1	14	..	6	..	146	4	Clerkenwell.
4	..	5	..	9	1	7	..	10	1	11	..	9	..	98	6	St. Luke, Middlesex.
3	..	2	1	4	..	6	..	7	..	1	..	2	..	34	2	London, City of.§
23	3	23	3	11	..	11	1	16	1	23	..	18	..	203	13	Shoreditch.
19	2	25	..	26	1	12	..	29	..	24	1	27	..	264	7	Bethnal Green.
12	1	13	1	17	..	13	..	19	..	13	..	16	..	210	4	Whitechapel.‖
2	1	6	..	1	..	7	..	19	..	5	2	8	1	80	4	St. George-in-the-East.
9	..	12	..	11	..	14	..	7	..	12	1	14	..	135	2	Limehouse.
20	1	22	1	18	1	30	..	22	1	29	1	21	1	293	6	Mile End Old Town.
16	1	11	..	16	..	17	..	20	1	33	3	43	1	290	6	Poplar.
2	..	4	..	2	..	6	..	6	..	2	..	2	..	49	2	St. Saviour, Southwark.
7	1	5	..	10	1	11	..	19	..	15	..	13	1	126	4	St. George, Southwark.
17	2	14	1	19	..	28	1	15	1	26	..	33	1	254	11	Newington.
..	..	2	..	..	..	2	..	..	..	4	..	5	..	24	..	St. Olave, Southwark.
7	..	12	..	11	..	13	..	20	1	14	3	15	2	134	8	Bermondsey.
1	1	6	..	2	..	6	1	11	2	10	..	17	1	98	7	Rotherhithe.
16	1	30	1	27	..	15	.	31	2	44	..	48	2	351	16	Lambeth.
32	..	31	..	34	..	38	1	44	5	80	1	58	..	491	14	Battersea.
27	1	13	..	21	1	27	..	15	..	26	2	20	1	294	7	Wandsworth.
27	..	19	..	15	..	31	..	26	1	35	3	41	2	334	8	Camberwell.
10	..	7	1	22	..	10	1	8	1	18	..	15	..	181	7	Greenwich.
4	..	5	..	8	..	4	..	5	..	12	..	12	..	80	1	Lewisham.
3	..	3	..	3	..	4	1	1	..	5	..	6	..	72	3	Woolwich.
1	..	5	..	5	..	3	..	6	1	4	..	16	..	63	1	Plumstead.
6	..	1	..	6	..	3	..	5	..	8	..	5	..	64	1	Lee.
..	..	..	..	1	..	..	..	..	..	1	..	..	..	3	..	Port of London.

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§ Including Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

	Sanitary Areas.	Population (1891).	SCARLET FEVER—*continued.*													
			Weekly Statement, 4th Quarter, 1897.													
			Oct. 9.		Oct. 16.		Oct. 23.		Oct. 30.		Nov. 6.		Nov. 13.		Nov. 20.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London (*Administrative County*)	4,232,118	686	20	789	18	797	16	711	22	658	20	550	20	544	27
W. District.	Kensington	166,308	26	1	30	2	24	1	24	1	14	2	22	..	19	5
	Fulham	91,639	33	..	22	..	23	..	24	1	26	1	16	..	31	..
	Hammersmith	97,239	12	..	14	1	10	..	19	..	10	..	11	..	12	..
	Paddington	117,846	10	1	13	..	11	..	26	..	14	..	10	1	10	..
	Chelsea	96,253	12	1	4	..	4	..	12	..	9	1	11	..	18	..
	St. George, Hanover Sq.*	78,599	4	..	6	..	6	..	4	..	4	..	3	..	3	..
	Westminster	55,539	4	..	7	1	7	..	4	..	3	..	6	..	..	..
	St. James, Westminster	24,995	4	..	2	..	2	1	2	2	5	1	1	1	2	..
N. District.	St. Marylebone	142,404	19	..	16	..	15	1	17	..	15	..	6	..	9	1
	Hampstead	68,416	4	..	14	..	13	..	11	..	10	..	3	..	8	..
	St. Pancras	234,379	25	..	35	1	33	..	32	..	28	..	17	..	22	..
	Islington	319,143	60	1	45	2	65	1	58	2	43	2	31	2	24	3
	St. Mary, Stoke Newington	30,936	5	..	6	..	3	..	1	..	3	1	..	..	1	..
	Hackney	198,606	50	..	54	1	62	1	31	2	35	1	39	1	34	1
Central District.	St. Giles and St. George, Bloomsbury.	39,782	11	..	9	..	5	..	4	..	2	..	7	..	6	..
	St. Martin-in-the-Fields	14,616	1	..	4	..	..	..	1	..	1	..	..		1	..
	Strand†	25,217	3	..	5	1	3	..	4	..	1	..	..	..	2	..
	Holborn‡	34,043	3	..	3	..	2	..	..	1	2	..	3	..	..	..
	Clerkenwell	66,216	8	..	14	..	16	1	7	..	5	1	6	2	3	1
	St. Luke, Middlesex	42,440	6	..	10	..	9	..	7	..	7	..	8	..	3	1
	London, City of§	37,583	2	..	3	..	2	..	7	..	..	..	2	1	1	..
E. District.	Shoreditch	124,009	19	..	15	1	18	..	18	1	23	..	9	1	16	..
	Bethnal Green	129,132	16	..	17	..	24	..	15	..	23	3	16	..	16	1
	Whitechapel‖	74,420	7	..	7	1	14	..	4	..	8	..	2	..	4	..
	St. George-in the-East	45,795	8	..	14	1	4	..	6	..	4	..	9	3	8	..
	Limehouse	57,376	31	1	23	..	22	..	17	2	15	1	9	..	7	..
	Mile End Old Town	107,592	25	..	21	..	22	..	17	..	20	..	15	1	17	..
	Poplar	166,748	31	2	22	..	44	1	31	1	27	..	31	1	37	3
S. District.	St. Saviour, Southwark	27,177	..	1	3	..	3	..	..	..	5	..	4	..	2	1
	St. George, Southwark	59,712	9	..	11	..	8	..	14	..	13	1	14	1	7	2
	Newington	115 804	19	..	37	1	43	..	36	2	26	1	13	1	13	..
	St. Olave, Southwark	12,723	6	1	8	..	6	..	6	..	2	..	1	..	2	..
	Bermondsey	84,682	20	1	22	1	21	1	18	2	25	..	27	..	13	1
	Rotherhithe	39,255	3	2	10	..	19	1	12	..	12	1	11	1	11	1
	Lambeth	275,203	50	2	46	..	44	1	55	..	52	1	43	..	39	..
	Battersea	150,558	55	2	62	2	54	1	59	2	59	1	50	1	35	1
	Wandsworth	156,942	14	..	31	..	34	1	15	..	27	..	15	..	30	..
	Camberwell	235,344	15	1	40	1	39	1	28	1	27	1	31	..	26	1
	Greenwich	165,413	16	3	26	1	25	3	23	1	10	..	12	2	9	1
	Lewisham	92,647	14	..	14	..	10	..	6	1	9	..	8	..	9	1
	Woolwich	40,848	7	..	12	..	9	..	6	..	12	..	10	..	11	1
	Plumstead	52,436	13	..	24	..	14	..	20	..	16	..	12	..	19	..
	Lee	36,103	6	..	8	..	5	..	10	..	6	..	6	..	3	1
	Port of London	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..

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* Including St. Peters, Westminster (population, 235).
† Including Middle Temple (population, 95).
‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136), St
Inn (population, 21), and Furnival's Inn (population, 121).

SCARLET FEVER—*continued.*																
Weekly Statement, 4th Quarter, 1897—*continued.*												Totals for 4th Quarter, 1897.		Grand Totals for Year 1897.		Sanitary Areas.
Nov. 27.		Dec. 4.		Dec. 11.		Dec. 18.		Dec. 25.		Jan. 1, 1898.						
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
538	26	426	21	443	18	386	19	306	9	414	11	7,248	247	22,876	778	London, (*Administrative County.*)
23	..	21	2	11	2	10	1	5	..	9	1	238	18	749	30	Kensington.
16	3	11	..	29	3	7	1	14	1	8	..	260	10	761	26	Fulham.
5	..	8	..	14	1	9	1	2	..	7	..	133	3	396	11	Hammersmith.
19	..	10	..	11	1	11	..	12	..	11	1	168	4	489	21	Paddington.
10	2	8	1	7	..	7	..	2	..	7	..	111	5	489	17	Chelsea.
4	..	1	1	7	..	3	..	3	..	2	..	50	1	177	7	St. George, Hanover Sq.*
3	..	3	..	4	..	2	1	1	..	1	..	45	2	181	13	Westminster.
4	..	3	..	1	..	3	..	..	..	1	..	30	5	131	8	St. James, Westminster.
9	..	5	..	6	..	4	1	4	..	6	..	131	3	397	9	St. Marylebone.
7	..	3	..	2	..	2	..	6	..	3	..	86	..	224	6	Hampstead.
18	1	16	..	13	1	9	1	9	..	12	1	269	5	942	24	St. Pancras.
34	1	20	1	25	1	30	1	16	1	17	1	468	19	1,577	61	Islington.
4	..	1	..	2	..	..	..	..	..	..	..	26	1	108	2	St.Mary,StokeNewington.
29	2	29	1	19	..	21	..	14	2	34	..	451	12	1,374	37	Hackney.
7	..	2	1	3	..	2	..	..	..	3	..	61	1	209	7	St. Giles and St. George, Bloomsbury.
4	1	1	..	..	..	..	..	1	..	1	..	15	1	44	2	St. Martin-in-the-Fields.
1	..	2	..	4	..	..	..	2	..	2	..	29	1	127	3	Strand.†
1	..	1	..	3	..	..	..	..	..	2	..	20	1	119	4	Holborn.‡
7	..	6	1	8	..	6	..	3	..	4	..	93	6	366	14	Clerkenwell.
8	..	5	..	4	2	4	..	1	1	3	1	75	5	238	13	St. Luke, Middlesex.
1	..	2	..	5	1	..	..	..	..	..	..	25	2	96	8	London, City of.§
20	3	7	..	7	1	8	..	10	..	12	..	182	7	627	29	Shoreditch.
17	1	19	..	11	..	14	2	10	..	13	1	211	8	723	25	Bethnal Green.
6	..	5	..	8	1	7	..	4	..	21	..	97	2	500	15	Whitechapel.‖
4	..	6	1	2	..	8	..	2	..	3	..	78	5	244	14	St. George-in-the-East.
8	2	9	..	9	..	5	..	8	..	3	..	166	6	428	12	Limehouse.
19	..	15	..	10	1	18	1	20	..	15	..	234	3	817	12	Mile End Old Town.
36	1	16	1	28	..	25	1	17	1	29	..	374	12	1,041	28	Poplar.
..	..	1	..	1	..	2	..	3	..	1	1	25	3	131	7	St. Saviour, Southwark.
8	..	6	1	2	..	9	1	2	..	10	..	113	6	381	14	St. George, Southwark.
14	2	16	..	20	2	16	1	10	..	11	..	274	10	769	33	Newington.
1	..	3	..	3	..	..	1	1	..	..	..	39	2	88	2	St. Olave, Southwark.
8	2	13	2	8	1	6	1	2	..	6	1	189	13	507	34	Bermondsey.
6	..	9	..	5	..	2	1	..	..	5	..	105	7	289	22	Rotherhithe.
38	..	32	1	32	..	27	1	24	1	36	..	518	7	1,395	42	Lambeth.
27	3	35	2	34	..	22	..	33	..	32	..	557	15	1,585	47	Battersea.
30	..	21	2	10	..	28	..	21	..	25	1	301	4	1,024	29	Wandsworth.
37	1	12	3	33	..	21	..	14	..	22	2	345	12	1,194	32	Camberwell.
9	..	11	..	13	..	16	1	4	1	16	..	190	13	818	32	Greenwich.
3	..	3	..	7	..	1	..	7	..	..	..	91	2	299	9	Lewisham.
7	..	3	..	3	..	7	..	4	1	10	..	101	2	224	8	Woolwich.
22	1	20	..	14	..	10	1	13	..	6	..	203	2	373	6	Plumstead.
4	..	6	..	5	..	4	..	2	..	5	..	70	1	210	3	Lee.
..	..	..	..	..	..	..	..	..	..	..	..	1	..	15	..	Port of London.

§ Including Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

	Sanitary Areas.	Population (1891).	DIPHTHERIA—*continued.*										
			Weekly Statement, 2nd Quarter, 1897.										
			April 10.		April 17.		April 24.		May 1.		May 8.		Ma
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.
	London (*Administrative County*)	4,232,118	195	22	168	30	180	39	173	39	203	27	195
W. District.	Kensington	166,308	1	..	6	1	7	..	5	..	4	..	7
	Fulham	91,639	4	..	3	..	4	1	5	2	5	..	5
	Hammersmith	97,239	..	..	3	..	2	1	3	3	1	..	1
	Paddington	117,846	5	..	3	1	5	2	5	2	10	4	5
	Chelsea	96,253	5	1	5	1	7	4	4	1	6	..	7
	St. George, Hanover Sq.*	78,599	..	..	..	..	2	..	3	..	2	1	..
	Westminster	55,539	..	..	2	..	..	..	..	..	..	..	1
	St. James, Westminster	24,995	..	..	..	..	1	..	1	..	..	..	1
N. District.	St. Marylebone	142,404	..	..	2	..	..	..	3	..	2	1	..
	Hampstead	68,416	2	..	1	..	1	..	..	..	2	..	3
	St. Pancras	234,379	5	..	4	1	6	1	10	3	9	1	6
	Islington	319,143	9	..	8	1	9	..	5	..	11	4	15
	St. Mary, Stoke Newington	30,936	2	..	1	1	..	..	..	..	1	..	..
	Hackney	198,606	14	1	18	2	16	6	9	3	16	3	15
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	1	..	2	..	1	..	..	..	2
	St. Martin-in-the-Fields	14,616	..	..	..	..	..	..	..	..	1	..	..
	Strand†	25,217	2	..	..	..	..	..	..	..	..	1	..
	Holborn‡	34,043	1	..	1	..	2	..	..	..	1	..	3
	Clerkenwell	66,216	6	..	2	1	4	1	7	..	4	..	3
	St. Luke, Middlesex	42,440	2	..	1	1	3	1	5	1	1	..	2
	London, City of §	37,583	3	1	1	1	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	4	1	3	..	10	1	3	3	5	..	3
	Bethnal Green	129,132	12	..	11	2	6	2	10	1	6	1	5
	Whitechapel‖	74,420	9	..	5	3	6	1	5	1	5	..	6
	St. George-in-the-East	45,795	1	..	..	..	1	..	..	..	4	..	3
	Limehouse	57,376	6	..	..	1	5	..	4	2	5	1	3
	Mile End Old Town	107,592	1	3	4	..	4	1	7	1	8	..	14
	Poplar	166,748	11	2	9	1	12	3	13	3	8	3	12
S. District.	St. Saviour, Southwark	27,177	1	..	..	..	1	..	1	1	1	..	2
	St. George, Southwark	59,712	1	..	1	..	..	..	5	..	9	1	4
	Newington	115,804	3	1	6	1	5	..	..	2	5	..	4
	St. Olave, Southwark	12,723	1	..	..	..	..	..	3	..	1	..	..
	Bermondsey	84,682	8	2	3	4	3	1	2	..	13	..	7
	Rotherhithe	39,255	1	..	..	..	..	..	3	..	..	..	..
	Lambeth	275,203	14	2	10	1	13	2	12	5	15	4	12
	Battersea	150,558	7	..	12	1	8	4	8	1	9	1	3
	Wandsworth	156,942	5	2	4	..	6	1	5	1	3	..	12
	Camberwell	235,344	22	5	16	2	14	2	7	2	14	1	12
	Greenwich	165,413	20	..	10	2	8	3	9	1	9	..	7
	Lewisham	92,647	1	1	2	..	2	..	3	..	2	..	2
	Woolwich	40,848	3	..	3	..	1	..	2	..	2	..	3
	Plumstead	52,436	2	..	3	1	1	..	1	..	2	..	1
	Lee	36,103	1	..	4	..	3	1	4	..	..	..	4
	Port of London	..	..	..	..	..	..	..	..	..	1	..	..

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (populati

‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (populatio
Staple Inn (population, 21), and Furnival's Inn (population, 121).

DIPHTHERIA—*continued.*																
Weekly Statement, 1st Quarter, 1897—*continued.*														Totals for 1st Quarter, 1897.		Sanitary Areas.
Feb. 20.		Feb. 27.		Mar. 6.		Mar. 13.		Mar. 20.		Mar. 27.		April 3.				
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
240	37	263	62	257	43	209	53	224	37	212	41	187	41	2,920	635	London. (*Administrative County.*)
2	..	8	1	7	..	8	4	10	1	3	2	7	..	73	14	Kensington.
4	..	5	1	9	..	9	3	7	..	6	2	3	1	70	10	Fulham.
3	2	4	..	3	1	1	1	2	..	3	..	2	2	46	15	Hammersmith.
2	..	7	1	6	2	4	2	..	..	4	..	3	1	62	14	Paddington.
10	1	5	..	10	1	5	2	7	..	7	..	5	..	77	11	Chelsea.
1	..	1	1	..	..	..	..	1	..	1	..	1	..	15	4	St. George, Hanover Sq.*
2	..	3	..	3	..	4	1	2	..	2	..	1	..	27	4	Westminster.
..	..	..	..	2	..	1	..	1	..	1	..	4	1	14	1	St. James, Westminster.
6	1	7	1	6	1	1	..	2	2	2	..	..	..	41	9	St. Marylebone.
2	..	3	..	3	..	5	1	2	1	3	2	2	..	32	8	Hampstead.
6	2	8	5	2	..	9	4	8	1	12	2	4	3	96	30	St. Pancras.
12	2	16	6	18	4	11	..	23	..	10	2	21	..	221	42	Islington.
1	..	1	1	..	..	..	..	2	..	5	1	..	..	14	5	St.Mary,StokeNewington.
7	..	13	1	10	1	19	4	17	4	10	2	9	2	151	32	Hackney.
2	1	1	..	..	..	1	..	..	..	2	..	..	1	6	2	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	..	..	1	..	..	1	..	..	3	1	St. Martin-in-the-Fields.
..	..	3	..	..	..	1	1	1	1	..	..	1	..	9	3	Strand.†
1	..	..	..	4	1	2	..	3	1	2	..	..	..	20	4	Holborn.‡
7	1	4	1	2	..	1	1	1	..	..	1	1	..	33	9	Clerkenwell.
2	..	1	..	4	..	1	..	2	..	2	..	..	..	26	2	St. Luke, Middlesex.
1	1	1	..	2	..	1	..	..	..	..	..	3	..	13	1	London, City of.§
10	1	5	6	8	1	8	2	6	2	10	4	7	2	104	34	Shoreditch.
8	1	8	3	9	1	7	4	9	4	10	3	6	1	101	29	Bethnal Green.
3	..	7	2	9	..	5	..	4	2	6	1	3	1	64	9	Whitechapel.‖
5	1	3	1	3	1	4	..	4	1	3	..	2	..	42	8	St. George-in-the-East.
2	1	3	1	2	..	3	..	..	..	..	..	3	1	35	6	Limehouse.
11	..	12	2	10	2	3	1	6	1	10	2	10	3	115	26	Mile End Old Town.
14	1	12	4	11	1	8	1	13	..	11	4	7	1	155	31	Poplar.
1	..	1	..	..	..	1	..	1	..	..	..	1	..	11	1	St. Saviour, Southwark.
..	..	3	1	1	..	..	..	3	1	1	..	4	1	22	5	St. George, Southwark.
4	..	5	1	5	1	9	..	2	..	4	1	2	1	67	14	Newington.
..	..	1	..	..	..	1	..	..	..	..	..	2	..	7	..	St. Olave, Southwark.
7	..	10	..	8	3	7	1	1	2	8	..	7	3	74	25	Bermondsey.
..	..	7	1	6	..	..	1	2	..	2	..	1	..	25	9	Rotherhithe.
19	4	15	5	15	3	9	1	12	5	5	2	9	3	160	40	Lambeth.
9	2	7	1	4	1	6	..	5	1	8	1	12	2	103	19	Battersea.
12	3	15	2	25	6	26	8	21	5	14	4	8	3	159	41	Wandsworth.
30	6	32	4	22	5	17	5	21	..	21	2	18	4	330	53	Camberwell.
10	4	18	2	20	5	8	1	8	..	14	1	11	1	145	23	Greenwich.
11	1	4	4	3	1	..	2	5	1	3	..	3	2	63	17	Lewisham.
9	..	3	2	4	1	2	1	1	1	3	..	2	..	49	15	Woolwich.
1	..	..	..	1	..	1	..	2	..	..	..	..	1	13	2	Plumstead.
3	1	1	1	..	..	..	1	5	..	3	1	2	..	25	7	Lee.
..	..	..	..	..	..	..	..	1	..	1	..	..	..	2	..	Port of London.

§ Including Inner Temple (population, 90).

‖ Including Tower of London (population, 868).

	Sanitary Areas.	Population (1891).	DIPHTHERIA—*continued.*											
			Weekly Statement, 2nd Quarter, 1897.											
			April 10.		April 17.		April 24.		May 1.		May 8.		May 15.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. *(Administrative County)*	4,232,118	195	22	168	30	180	39	173	39	203	27	195	41
W. District.	Kensington	166,308	1	..	6	1	7	..	5	..	4	..	7	2
	Fulham	91,639	4	..	3	..	4	1	5	2	5	..	5	1
	Hammersmith	97,239	..	..	3	..	2	1	3	3	1	..	1	1
	Paddington	117,846	5	..	3	1	5	2	5	2	10	4	5	1
	Chelsea	96,253	5	1	5	1	7	4	4	1	6	..	7	1
	St. George, Hanover Sq.* ..	78,509	..	..	..	..	2	..	3	..	2	1	..	..
	Westminster	55,539	..	..	2	..	..	..	..	..	..	..	1	..
	St. James, Westminster ..	24,995	..	..	..	..	1	..	1	..	..	..	1	..
N. District.	St. Marylebone	142,404	..	..	2	..	..	..	3	..	2	1	..	..
	Hampstead	68,416	2	..	1	..	1	..	..	..	2	..	3	1
	St. Pancras	234,379	5	..	4	1	6	1	10	3	9	1	6	1
	Islington	319,143	9	..	8	1	9	..	5	..	11	4	15	4
	St. Mary, Stoke Newington	30,936	2	..	1	1	..	..	..	..	1	..	..	1
	Hackney	198,606	14	1	18	2	16	6	9	3	16	3	15	2
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	1	..	2	..	1	..	..	..	2	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	1	..	..	..
	Strand†	25,217	2	..	..	..	..	..	..	..	..	1	..	..
	Holborn‡	34,043	1	..	1	..	2	..	..	..	1	..	3	..
	Clerkenwell	66,216	6	..	2	1	4	1	7	..	4	..	3	..
	St. Luke, Middlesex ..	42,440	2	..	1	1	3	1	5	1	1	..	2	..
	London, City of §	37,583	3	1	1	1	..	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	4	1	3	..	10	1	3	3	5	..	3	..
	Bethnal Green	129,132	12	..	11	2	6	2	10	1	6	1	5	4
	Whitechapel‖	74,420	9	..	5	3	6	1	5	1	5	..	6	2
	St. George-in-the-East ..	45,795	1	..	..	..	1	..	..	..	4	..	3	1
	Limehouse	57,376	6	..	..	1	5	..	4	2	5	1	3	..
	Mile End Old Town ..	107,592	1	3	4	..	4	1	7	1	8	..	14	1
	Poplar	166,748	11	2	9	1	12	3	13	3	8	3	12	3
S. District.	St. Saviour, Southwark ..	27,177	1	..	..	..	1	..	1	1	1	..	2	1
	St. George, Southwark ..	59,712	1	..	1	..	..	..	5	..	9	1	4	1
	Newington	115,804	3	1	6	1	5	..	..	2	5	..	4	1
	St. Olave, Southwark ..	12,723	1	..	..	..	..	..	3	..	1	..	..	..
	Bermondsey	84,682	8	2	3	4	3	1	2	..	13	..	7	3
	Rotherhithe	39,255	1	..	..	..	..	..	3	..	..	..	..	..
	Lambeth	275,203	14	2	10	1	13	2	12	5	15	4	12	1
	Battersea	150,558	7	..	12	1	8	4	8	1	9	1	3	1
	Wandsworth	156,942	5	2	4	..	6	1	5	1	3	..	12	2
	Camberwell	235,344	22	5	16	2	14	2	7	2	14	1	12	1
	Greenwich	165,413	20	..	10	2	8	3	9	1	9	..	7	2
	Lewisham	92,647	1	1	2	..	2	..	3	..	2	..	2	..
	Woolwich	40,848	3	..	3	..	1	..	2	..	2	..	3	1
	Plumstead	52,436	2	..	3	1	1	..	1	..	2	..	1	..
	Lee	36,103	1	..	4	..	3	1	4	..	..	..	4	1
	Port of London	..	..	..	..	..	..	..	..	..	1	..	..	..

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population, 95).

‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136), Staple Inn (population, 21), and Furnival's Inn (population, 121).

DIPHTHERIA—*continued.*

Weekly Statement, 2nd Quarter, 1897—*continued.*														Totals for 2nd Quarter, 1897.		Sanitary Areas.
May 22.		May 29.		June 5.		June 12.		June 19.		June 26.		July 3.				
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
206	33	218	36	220	32	225	39	232	29	208	24	224	32	2,647	423	London. (*Administrative County.*)
3	2	4	3	7	6	7	1	2	..	2	..	8	2	63	17	Kensington.
6	..	8	2	9	1	10	2	5	2	4	1	2	1	70	13	Fulham.
3	..	5	1	1	..	4	..	4	..	2	1	3	1	32	8	Hammersmith.
7	..	7	..	11	..	5	2	5	1	6	..	6	..	80	13	Paddington.
10	1	7	3	8	..	5	1	6	..	4	2	7	3	81	18	Chelsea.
1	..	6	..	6	1	2	..	1	..	1	..	1	..	25	2	St. George, Hanover Sq.*
3	1	6	..	3	1	2	..	4	2	1	..	3	..	25	4	Westminster.
..	..	1	..	..	..	1	..	1	..	1	..	1	..	8	..	St. James, Westminster.
1	1	3	..	7	..	6	2	4	2	5	..	1	..	34	6	St. Marylebone.
4	..	2	..	..	..	..	..	6	..	1	..	..	1	22	2	Hampstead.
9	1	10	1	5	1	10	..	10	2	7	4	10	2	101	18	St. Pancras.
18	3	12	1	16	3	14	2	14	1	12	2	10	2	153	23	Islington.
3	1	..	2	1	..	2	..	..	..	1	..	2	1	13	6	St.Mary,StokeNewington.
8	2	14	1	4	..	16	1	11	..	11	1	11	2	163	24	Hackney.
2	..	3	..	1	..	3	..	1	..	..	..	2	1	18	1	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	..	..	..	..	1	..	..	..	2	..	St. Martin-in-the-Fields.
[illegible]	..	..	..	2	..	..	..	..	..	2	..	1	..	7	1	Strand.†
..	..	3	..	8	1	2	..	4	..	10	..	7	2	42	3	Holborn.‡
3	..	6	..	6	2	2	..	6	2	3	1	3	..	55	7	Clerkenwell.
..	1	4	1	3	..	3	1	5	..	3	..	10	..	42	6	St. Luke, Middlesex.
..	..	2	..	..	..	..	..	2	..	1	..	..	..	9	2	London, City of.§
2	..	2	..	8	1	8	7	5	..	8	..	3	..	64	13	Shoreditch.
11	1	4	2	4	..	10	1	8	..	5	..	16	..	108	14	Bethnal Green.
8	1	5	..	4	..	9	..	7	1	9	..	5	1	83	10	Whitechapel.‖
7	..	7	1	5	1	11	4	3	1	9	1	..	..	51	9	St. George-in-the-East.
3	..	3	..	4	2	5	..	8	3	..	..	5	..	51	9	Limehouse.
8	2	10	2	10	..	10	..	11	2	9	..	5	..	101	12	Mile End Old Town.
10	2	11	2	9	3	13	3	15	3	9	1	12	..	144	29	Poplar.
..	..	1	..	1	..	2	..	2	..	1	..	5	..	18	2	St. Saviour, Southwark.
1	..	3	1	..	..	3	1	6	..	1	1	5	..	39	5	St. George, Southwark.
8	1	4	3	4	1	1	1	8	..	6	..	5	2	59	13	Newington.
..	..	..	..	..	..	..	..	..	..	..	..	1	..	6	..	St. Olave, Southwark.
3	2	3	..	5	1	4	1	2	2	4	..	1	..	58	16	Bermondsey.
3	..	3	2	..	..	3	2	2	..	2	..	2	..	19	4	Rotherhithe.
15	2	8	2	11	1	9	1	11	1	17	..	10	3	157	25	Lambeth.
12	1	13	2	8	2	3	..	7	..	11	3	9	3	110	19	Battersea.
9	2	7	1	7	3	12	1	4	1	4	2	5	..	83	16	Wandsworth.
13	4	17	1	26	..	19	1	23	2	15	4	31	3	229	28	Camberwell.
9	2	7	..	10	..	6	3	12	1	11	..	11	1	129	15	Greenwich.
3	..	4	2	1	..	1	..	3	..	2	..	2	..	28	3	Lewisham.
..	..	2	..	4	1	2	1	1	..	3	..	..	..	26	3	Woolwich.
..	..	1	..	1	..	..	..	3	..	4	..	2	1	21	2	Plumstead.
..	..	..	..	..	..	..	..	..	..	..	..	1	..	17	2	Lee.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Port of London.

§ Including Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

	Sanitary Areas.	Population (1891)	DIPHTHERIA—*continued.* Weekly Statement, 3rd Quarter, 1897. July 10. Cases.	July 10. Deaths.	July 17. Cases.	July 17. Deaths.	July 24. Cases.	July 24. Deaths.	July 31. Cases.	July 31. Deaths.	Aug. 7. Cases.	Aug. 7. Deaths.	Aug. 14 Cases.	Aug. 14 Deaths.
	London .. .. (*Administrative County*)	4,232,118	261	43	318	35	300	41	281	41	261	42	269	38
W. District.	Kensington	166,208	2	2	8	1	5	2	7	..	9	1	6	1
	Fulham	91,639	5	1	9	..	5	1	7	1	6	1	17	2
	Hammersmith	97,239	..	..	3	..	1	..	4	..	3	..	2	..
	Paddington	117,846	10	2	7	1	10	2	6	2	10	1	12	5
	Chelsea..	96,253	9	1	5	1	4	1	8	1	5	1	6	..
	St. George, Hanover Sq.* ..	78,599	5	..	4	..	1	..	1	..	2	..	2	1
	Westminster	55,539	2	1	5	..	4	..	2	..	3	2	5	..
	St. James, Westminster ..	24,995	1	..	3	..	1	..	2	..	2	..	1	1
N. District.	St. Marylebone	142,404	2	..	7	1	5	1	12	..	4	3	5	3
	Hampstead	68,416	3	..	..	..	2	..	3	..	..	1	..	..
	St. Pancras	234,379	14	2	11	2	18	2	6	2	9	..	8	4
	Islington	319,143	8	1	20	3	10	2	14	4	19	3	6	2
	St. Mary, Stoke Newington	30,936	..	..	..	..	1	..	2	1	1	..	..	1
	Hackney	198,606	18	..	16	1	17	4	12	4	13	3	17	1
Central District.	St. Giles and St. George, Bloomsbury.	39,782	4	..	1	1	3	..	..	1	1	..	1	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	1	..	..	..
	Strand†	25,217	2	..	1	..	..	..	..	..	..	..	..	..
	Holborn‡	34,043	6	..	10	..	14	1	9	2	2	2	5	2
	Clerkenwell	66,216	9	1	7	1	17	1	18	2	7	1	11	..
	St. Luke, Middlesex ..	42,440	5	1	8	..	9	2	7	..	6	..	6	1
	London, City of§	37,583	1	..	1	..	..	..	2	..	1	..	2	..
E. District.	Shoreditch	124,009	4	..	8	..	15	3	7	2	10	1	7	2
	Bethnal Green	129,132	8	1	12	..	8	1	9	2	17	..	15	1
	Whitechapel‖	74,420	4	..	4	..	13	1	5	..	3	2	7	1
	St. George-in-the-East ..	45,795	3	2	4	..	7	..	1	..	7	..	2	..
	Limehouse	57,376	2	..	8	..	5	2	5	2	2	..	5	..
	Mile End Old Town ..	107,592	12	1	14	3	11	..	11	1	5	..	7	1
	Poplar	166.748	14	3	16	3	9	1	5	1	13	1	12	1
S. District.	St. Saviour, Southwark ..	27.177	4	1	2	..	2	..	1	..	6	..	2	..
	St. George, Southwark ..	59,712	10	4	5	2	4	1	7	..	2	1	6	..
	Newington	115,804	7	2	11	2	5	1	5	..	4	3	8	..
	St. Olave, Southwark ..	12,723	..	..	2	..	..	..	..	..	1	..	1	..
	Bermondsey	84,682	7	1	6	2	1	..	1	1	5	..	4	..
	Rotherhithe	39,255	3	..	1	..	..	..	2	..	2	..	2	..
	Lambeth	275,203	11	1	25	4	12	2	18	1	17	6	15	2
	Battersea	150,558	8	2	9	2	12	2	18	1	14	4	18	2
	Wandsworth	156,942	9	1	7	2	15	2	9	..	5	..	6	1
	Camberwell	235,344	33	8	32	..	26	5	35	6	21	4	16	2
	Greenwich	165,413	12	2	12	2	16	..	15	1	12	1	20	1
	Lewisham	92,647	..	..	2	..	2	..	1	..	3	..	2	..
	Woolwich	40,848	..	..	6	..	4	..	2	2	3	..	1	..
	Plumstead	52,436	3	1	3	1	4	..	2	..	4	..	1	..
	Lee	36,103	1	1	3	..	2	1	..	1	..	..	..	..
	Port of London	..	..	..	..	..	..	..	..	..	1	..	..	..

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population, [illegible]).
‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, [illegible]), Staple Inn (population, 21), and Furnival's Inn (population, 121).

DIPHTHERIA—*continued.*

Weekly Statement, 3rd Quarter, 1897—*continued.*														Totals for 3rd Quarter, 1897.		Sanitary Areas.
Aug. 21.		Aug. 28.		Sept. 4.		Sept. 11.		Sept. 18.		Sept. 25.		Oct. 2.				
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
171	29	206	28	233	35	256	25	267	35	309	44	290	48	3,422	484	London. (*Administrative County.*)
8	2	5	1	4	1	6	1	4	2	9	1	8	3	81	18	Kensington.
4	1	5	..	10	2	9	2	11	2	10	1	9	1	107	15	Fulham.
10	1	3	..	1	1	1	1	2	..	1	..	2	..	33	3	Hammersmith.
4	1	1	..	5	..	7	1	7	2	8	4	3	2	90	23	Paddington.
2	..	4	..	1	1	6	..	8	2	2	2	6	..	66	10	Chelsea.
2	..	4	..	3	..	..	..	1	1	1	..	3	1	29	3	St. George, Hanover Sq.*
2	1	1	..	..	..	1	..	1	..	3	..	1	1	30	5	Westminster.
..	..	2	..	..	1	..	..	1	..	..	..	..	..	13	2	St. James, Westminster.
5	4	3	1	1	..	7	..	7	..	6	3	4	1	68	17	St. Marylebone.
1	..	2	..	1	1	..	..	5	1	2	..	1	..	20	3	Hampstead.
2	1	5	2	11	1	2	..	7	2	7	2	9	1	109	21	St. Pancras.
5	..	16	1	11	2	11	..	19	1	8	4	9	2	156	25	Islington.
..	..	..	..	3	..	..	..	..	..	..	..	1	..	8	2	St.Mary,StokeNewington.
12	2	11	3	11	..	22	2	13	2	18	1	16	5	196	28	Hackney.
..	..	..	..	1	..	1	..	3	..	1	..	2	..	18	2	St. Giles and St. George, Bloomsbury.
..	..	1	..	..	..	1	..	..	..	..	..	..	..	3	..	St. Martin-in-the-Fields.
..	..	1	..	..	..	..	..	3	..	..	..	1	1	8	1	Strand.†
5	..	6	..	2	..	4	..	1	..	2	..	3	..	69	7	Holborn.‡
5	..	12	..	16	2	8	2	12	1	16	..	8	1	146	12	Clerkenwell.
3	..	2	1	2	..	6	2	7	..	3	..	7	..	71	7	St. Luke, Middlesex.
1	..	..	..	..	..	..	..	..	..	4	..	2	1	14	1	London, City of.§
4	..	5	..	4	..	13	1	5	1	13	..	12	1	107	11	Shoreditch.
11	1	4	2	10	1	11	..	14	1	16	2	14	3	149	15	Bethnal Green.
1	..	6	1	9	2	11	1	7	..	14	3	3	..	87	11	Whitechapel.‖
1	..	2	..	1	..	2	..	4	..	6	3	3	..	43	5	St. George-in-the-East.
2	..	2	..	3	1	6	..	1	..	6	2	6	..	53	7	Limehouse.
2	1	9	..	5	1	10	1	15	1	9	..	9	1	119	11	Mile End Old Town.
5	..	13	1	11	..	9	1	10	..	16	2	11	2	144	16	Poplar.
..	..	3	..	2	1	3	..	2	..	..	1	2	..	29	3	St. Saviour, Southwark.
..	..	3	..	5	1	4	2	3	..	6	1	5	..	60	12	St. George, Southwark.
2	3	4	..	3	..	7	..	3	2	7	1	15	1	81	15	Newington.
1	..	1	..	..	..	..	..	1	1	1	..	..	..	8	1	St. Olave, Southwark.
4	2	1	..	6	4	8	..	8	..	14	2	5	..	70	12	Bermondsey.
1	..	1	2	2	..	..	..	1	1	3	1	..	..	18	4	Rotherhithe.
14	3	9	1	24	3	14	1	14	..	14	1	19	6	206	31	Lambeth.
12	2	15	3	15	1	15	1	11	3	17	2	15	4	179	29	Battersea.
6	1	5	1	10	5	15	1	17	3	14	3	14	1	132	21	Wandsworth.
18	2	22	4	16	1	16	2	21	5	27	2	34	5	317	46	Camberwell.
10	..	11	3	14	2	8	1	10	..	10	..	16	2	166	15	Greenwich.
1	..	2	..	2	..	5	..	3	..	6	..	7	1	36	1	Lewisham.
2	..	2	..	5	..	3	1	1	1	3	..	1	..	33	4	Woolwich.
1	1	2	..	2	..	1	1	3	..	3	..	1	1	30	5	Plumstead.
2	..	..	1	1	..	3	..	1	..	3	..	3	..	19	4	Lee.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Port of London.

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ncluding Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

DIPHTHERIA—*continued.*

Weekly Statement, 4th Quarter, 1897.

	Sanitary Areas.	Population (1891).	Oct. 9.		Oct. 16.		Oct. 23.		Oct. 30.		Nov. 6.		Nov. 13.		Nov. 20.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. (*Administrative County*)	4,232,118	303	53	351	44	363	54	319	65	303	58	279	44	301	36
W. District.	Kensington	166,208	10	4	10	4	12	2	8	1	8	2	8	4	9	..
	Fulham	91,639	4	1	7	1	9	1	16	3	13	2	17	3	10	1
	Hammersmith	97,239	2	..	..	..	2	..	6	..	1	..	4	..	6	..
	Paddington	117,846	4	..	7	1	5	..	2	..	7	1	3	..	11	1
	Chelsea	96,253	3	2	12	1	6	1	8	2	8	..	8	..	5	..
	St. George, Hanover Sq.* ..	78,599	5	..	5	1	2	2	6	2	9	..	5	..	2	1
	Westminster	55,539	2	1	3	3	1	..	1	..	2	2	3	..	1	..
	St. James, Westminster ..	24,995	..	..	2	..	4	..	..	..	1	..	2	..	1	..
N. District.	St. Marylebone	142,404	7	1	7	1	9	..	7	1	7	..	7	1	4	3
	Hampstead	68,416	2	1	2	1	3	..	4	..	5	1	1	..	..	..
	St. Pancras	234,379	16	..	36	4	26	2	16	6	11	4	11	4	21	3
	Islington	319,143	16	1	23	3	9	6	13	2	10	..	7	2	13	2
	St. Mary, Stoke Newington	30,936	..	..	4	..	1	1	3	1	..	..	1	..	..	..
	Hackney	198,606	16	6	29	2	19	5	16	3	18	3	14	1	14	1
Central District.	St. Giles and St. George, Bloomsbury.	39,782	1	..	3	..	2	1	2	..	..	..	1	..	..	..
	St. Martin-in-the-Fields ..	14,616	..	1	1	..	..	..	1	..	1	1	..	..	..	..
	Strand†	25,217	2	..	2	..	3	..	1	..	..	..	..	..	2	..
	Holborn‡	34,043	1	1	4	..	2	1	1	..	1	..	1	..	1	..
	Clerkenwell	66,216	10	2	13	1	17	4	8	1	13	2	8	3	7	2
	St. Luke, Middlesex ..	42,440	6	..	7	..	3	1	5	..	6	..	..	..	3	..
	London, City of§	37,583	1	..	..	..	..	1	1	..	2	2	2	..	..	..
E. District.	Shoreditch	124,009	4	2	8	2	8	2	5	3	6	..	8	2	5	1
	Bethnal Green	129,132	18	3	21	3	13	2	11	5	16	..	5	..	17	3
	Whitechapel‖	74,420	4	..	2	..	6	..	6	1	5	2	1	..	3	..
	St. George-in-the-East ..	45,795	6	2	2	..	9	1	7	..	2	1	7	..	2	..
	Limehouse	57,376	10	1	6	2	8	..	2	2	1	..	4	1	5	..
	Mile End Old Town ..	107,592	7	1	13	1	11	1	8	..	8	5	2	..	10	..
	Poplar	166,748	12	5	10	..	32	1	19	7	11	5	17	5	31	2
S. District.	St. Saviour, Southwark ..	27,177	1	..	3	..	4	1	4	2	4	1	5	2	3	..
	St. George, Southwark ..	59,712	7	..	2	..	6	..	8	..	10	1	6	1	6	..
	Newington	115,804	13	2	5	3	9	..	6	..	11	4	9	..	7	..
	St. Olave, Southwark ..	12,723	2	..	..	..	1	..	..	..	..	..	..	..	1	..
	Bermondsey	84,682	4	..	5	..	4	..	6	1	4	1	12	..	6	..
	Rotherhithe	39,255	5	..	1	..	3	1	4	..	1	..	1	..	2	1
	Lambeth	275,203	24	5	13	4	19	3	17	2	15	3	16	2	14	2
	Battersea	150,558	17	..	15	1	20	5	22	4	21	7	10	3	17	2
	Wandsworth	156,942	17	3	18	1	14	3	12	1	11	2	12	4	14	3
	Camberwell	235,344	17	1	22	..	28	..	22	4	21	3	20	4	20	3
	Greenwich	165,413	11	2	11	..	13	2	18	4	6	..	10	..	10	1
	Lewisham	92,647	1	..	1	..	6	..	2	2	9	..	16	1	10	4
	Woolwich	40,848	3	1	6	1	3	2	3	2	5	1	2	..	1	..
	Plumstead	52,436	4	3	6	3	8	2	9	3	7	1	10	1	4	..
	Lee	36,103	8	1	4	..	3	..	3	..	6	1	3	..	3	..
	Port of London	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population, 95)

‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136) Staple Inn (population, 21), and Furnival's Inn (population, 121).

	Sanitary Areas.	Population (1891).	ENTERIC FEVER. Weekly Statement, 1st Quarter, 1897.											
			Jan. 9.		Jan. 16.		Jan. 23.		Jan. 30.		Feb. 6.		Feb. 13.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. (*Administrative County*)	4,232,118	48	9	55	14	50	6	50	7	37	15	59	9
W. District.	Kensington	166,308	2	..	..	..	4	..	2	2	1	..	..	..
	Fulham	91,639	5	1	..	1	1	..	..	..	..	..	1	..
	Hammersmith	97,239	..	..	2	..	..	..	2	..	2	..	1	..
	Paddington	117,846	1	..	1	..	1	..	2	2	..	..	1	..
	Chelsea	96,253	1	..	3	2	..	..	..	..	1	..	3	..
	St. George, Hanover Sq.* ..	78,599	..	..	2	..	..	..	1	..	..	..	..	..
	Westminster	55,539	..	..	..	..	..	..	..	..	..	..	..	..
	St. James, Westminster ..	24,995	..	1	..	..	..	..	..	..	1	..	..	..
N. District.	St. Marylebone	142,404	4	..	2	2	1	2	1	1	..	..	2	..
	Hampstead	68,416	1	..	2	..	..	..	1	1	..	..	1	..
	St. Pancras	234,379	4	2	4	..	5	..	3	..	3	..	2	3
	Islington	319,143	2	..	1	..	3	..	2	..	5	1	3	..
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..	1	..	..	..	4	..
	Hackney	198,606	2	..	3	..	1	..	..	..	1	1	3	..
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	1	2	..	..	..	1	..	1	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	1	..	..	..
	Strand†	25,217	..	..	..	..	..	..	..	..	..	..	..	..
	Holborn‡	34,043	..	..	1	..	..	..	..	..	1	..	..	..
	Clerkenwell	66,216	1	..	..	..	..	..	5	..	1	2	3	..
	St. Luke, Middlesex ..	42,440	1	..	..	..	3	..	1	..	..	..	2	..
	London, City of§	37,583	..	..	1	..	2	..	..	..	1	1	1	..
E. District.	Shoreditch	124,009	2	1	2	..	1	..	2	..	1	1	..	1
	Bethnal Green	129,132	2	1	2	..	1	..	3	..	..	1	4	..
	Whitechapel‖	74,420	1	..	1	1	..	1	..	..	1	..	..	..
	St. George-in-the-East ..	45,795	..	1	2	..	1	..	1	..	..	..	1	..
	Limehouse	57,376	1	..	1	..	..	..	1	..	..	..	..	..
	Mile End Old Town ..	107,592	2	1	1	2	3	..	4	..	..	..	..	..
	Poplar	166,748	1	1	2	1	1	..	..	..	1	..	3	..
S. District.	St. Saviour, Southwark ..	27,177	..	..	1	..	1	..	1	..	..	..	..	..
	St. George, Southwark ..	59,712	..	..	1	..	2	1	..	..	1	..	1	..
	Newington	115,804	1	..	4	..	2	..	4	..	..	..	1	1
	St. Olave, Southwark ..	12,723	..	..	1	..	1	..	..	..	..	..	..	..
	Bermondsey	84,682	3	..	1	..	..	..	1	..	..	..	3	..
	Rotherhithe	39,255	..	..	1	..	..	..	1	..	..	..	2	..
	Lambeth	275,203	1	..	3	1	5	1	2	..	4	1	5	2
	Battersea	150,558	1	..	1	1	2	..	3	..	1	2	2	..
	Wandsworth	156,942	1	..	2	..	3	..	1	..	3	2	4	1
	Camberwell	235,344	1	..	4	1	..	1	..	1	3	1	..	..
	Greenwich	165,413	2	..	1	..	1	..	4	..	2	2	2	..
	Lewisham	92,647	3	..	1	1	1	..	..	..	..	..	3	..
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	..	..
	Plumstead	52,436	1	..	..	..	..	..	1	..	..	..	..	..
	Lee	36,103	..	..	..	..	1	..	..	..	1	..	..	1
	Port of London	.	1	..	1	..	1	..	..	..	..	..	..	..

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population, 95)

‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136) Staple Inn (population, 21), and Furnival's Inn (population, 121).

ENTERIC FEVER—*continued.*

Weekly Statement, 1st Quarter, 1897—*continued.*														Totals for 1st Quarter, 1897.		Sanitary Areas.
Feb. 20.		Feb. 27.		Mar. 6.		Mar. 13.		Mar. 20.		Mar. 27.		April 3.				
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
59	6	43	10	44	10	35	6	48	8	39	12	26	9	593	121	London. (*Administrative County.*)
1	..	1	1	1	1	3	..	3	1	3	..	..	..	21	5	Kensington.
..	..	..	..	4	..	..	..	1	..	..	..	..	..	12	2	Fulham.
2	..	..	..	1	1	..	..	..	..	..	..	..	..	10	1	Hammersmith.
..	..	..	..	..	..	1	..	..	..	2	..	..	..	9	2	Paddington.
3	..	2	2	..	..	1	..	2	..	..	1	1	1	17	6	Chelsea.
..	..	..	..	1	1	1	..	..	1	2	..	..	..	7	2	St. George, Hanover Sq.*
2	..	1	..	..	..	..	..	..	..	..	..	..	..	3	..	Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	St. James, Westminster.
1	..	..	..	2	..	1	..	1	1	2	1	..	..	17	7	St. Marylebone.
2	..	1	..	2	..	..	..	2	..	..	..	..	..	12	1	Hampstead.
2	..	3	..	1	1	1	1	3	..	..	..	1	1	32	8	St. Pancras.
6	1	5	2	3	..	2	1	6	1	3	1	1	1	42	8	Islington.
..	..	..	..	1	..	..	..	..	..	1	..	2	2	9	2	St.Mary,StokeNewington.
..	..	1	..	..	..	3	..	3	..	7	1	1	1	25	3	Hackney.
..	..	1	..	1	1	1	..	..	1	..	..	..	..	7	3	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. Martin-in-the-Fields.
1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Strand.†
..	..	..	..	..	..	..	..	..	..	1	..	1	..	4	..	Holborn.‡
..	..	1	1	1	..	..	..	1	..	..	..	1	..	14	3	Clerkenwell.
3	..	2	..	2	..	..	..	..	..	..	..	..	..	14	..	St. Luke, Middlesex.
..	..	..	1	..	..	..	..	..	..	..	..	..	..	5	2	London, City of.§
1	..	1	..	..	..	..	..	1	..	..	..	2	1	13	4	Shoreditch.
3	..	..	1	1	1	1	..	3	1	1	..	3	..	24	5	Bethnal Green.
1	..	2	..	2	..	..	..	3	..	..	..	1	..	12	2	Whitechapel.‖
1	..	..	1	1	..	..	..	1	..	..	..	..	..	8	2	St. George-in-the-East.
1	1	1	..	..	..	..	..	..	..	1	..	..	..	6	1	Limehouse.
1	1	..	..	1	..	4	..	..	..	1	..	..	..	17	4	Mile End Old Town.
2	..	4	..	5	1	1	2	..	..	..	1	2	..	22	6	Poplar.
1	..	..	..	..	..	..	..	1	..	..	1	..	..	5	1	St. Saviour, Southwark
2	..	..	..	..	..	..	..	..	..	..	..	..	..	7	1	St. George, Southwark.
2	..	1	..	..	..	1	..	1	..	..	1	1	..	18	2	Newington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	St. Olave, Southwark.
4	1	1	..	..	..	1	..	2	..	2	1	..	..	18	2	Bermondsey.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	Rotherhithe.
3	1	5	..	3	..	3	..	4	2	3	2	3	1	44	11	Lambeth.
1	..	2	..	..	1	1	..	1	..	2	..	..	..	17	4	Battersea.
3	..	1	..	3	..	2	..	2	..	2	..	..	..	27	3	Wandsworth.
4	..	2	..	1	..	3	..	3	..	2	1	1	1	24	6	Camberwell.
5	1	3	1	5	2	2	2	1	..	3	1	4	..	35	9	Greenwich
1	..	1	..	2	..	1	..	1	..	..	..	..	..	14	1	Lewisham.
..	..	..	..	..	..	1	..	1	..	..	..	..	..	2	..	Woolwich.
..	..	1	..	..	..	..	..	..	..	..	..	1	..	4	..	Plumstead.
..	..	..	..	..	..	..	..	1	..	1	..	..	..	4	1	Lee.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	Port of London.

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§ Including Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

	Sanitary Areas.	Population (1891).	Enteric Fever—*continued.*											
			Weekly Statement, 2nd Quarter, 1897.											
			April 10.		April 17.		April 24.		May 1.		May 8.		May 15.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. (*Administrative County*) ..	4,232,118	46	9	24	2	37	7	21	5	29	1	31	6
W. District.	Kensington	166,308	3	..	1	1	2	..	..	1	3	1	2	..
	Fulham	91,639	1	1	2	..	2	1	1	..	1	..	1	..
	Hammersmith	97,239	5	..	1	..	..	..	1	..	..	..	2	..
	Paddington	117,846	2	..	..	..	1	..	..	1	1	..	..	..
	Chelsea	96,253	..	..	..	..	2	..	..	..	..	..	..	..
	St. George, Hanover Sq.* ..	78,599	3	..	..	..	1	1	..	..	..	..	..	..
	Westminster	55,539	..	..	2	..	..	..	2	..	..	..	..	..
	St. James, Westminster ..	24,995	..	..	..	..	1	..	..	..	..	..	..	..
N. District.	St. Marylebone	142,404	..	..	..	..	1	..	..	..	2	..	..	..
	Hampstead	68,416	3	..	..	..	..	..	..	..	..	..	1	..
	St. Pancras	234,379	2	..	1	..	1	..	2	..	3	..	1	..
	Islington	319,143	2	1	2	..	2	1	1	2	2	..	3	..
	St. Mary, Stoke Newington	30,936	..	1	..	..	..	..	..	..	..	..	..	..
	Hackney	198,606	2	1	3	1	4	..	1	..	1	..	4	1
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	..	..	..	..	..	..	..	1	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	..	..	..	..
	Strand†	25,217	..	..	..	..	..	..	..	..	..	..	..	..
	Holborn‡	34,043	..	..	1	..	..	..	..	..	..	..	1	..
	Clerkenwell	66,216	2	..	..	..	..	..	..	..	..	..	1	..
	St. Luke, Middlesex ..	42,440	..	..	..	..	..	..	..	..	..	..	..	..
	London, City of§	37,583	..	..	..	..	..	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	2	..	..	..	..	..	..	..	1	..	1	..
	Bethnal Green	129,132	4	3	..	..	1	..	..	..	..	..	1	..
	Whitechapel‖	74,420	..	..	..	..	1	..	..	..	1	..	..	..
	St. George-in-the-East ..	45,795	..	..	..	..	..	..	..	..	..	..	..	..
	Limehouse	57,376	..	..	..	..	2	..	..	..	2	..	..	..
	Mile End Old Town ..	107,592	2	..	..	..	..	..	..	..	2	..	..	1
	Poplar	166,748	2	..	..	..	4	1	1	..	1	..	1	..
S. District.	St Saviour, Southwark ..	27,177	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Southwark ..	59,712	..	..	..	..	..	..	..	..	1	..	2	..
	Newington	115,804	1	..	1	..	..	..	1	..	1	..	..	..
	St. Olave, Southwark ..	12,723	..	..	1	..	..	..	..	..	..	..	..	..
	Bermondsey	84,682	..	1	..	..	1	..	..	..	1	..	1	..
	Rotherhithe	39,255	1	..	..	..	1	..	..	..	..	..	1	..
	Lambeth	275,203	2	1	..	..	6	..	6	..	1	..	1	1
	Battersea	150,558	1	..	3	..	..	..	3	..	1	..	..	..
	Wandsworth	156,942	..	..	1	..	..	1	..	1	..	..	3	1
	Camberwell	235,344	5	..	1	..	1	1	1	..	2	..	1	1
	Greenwich	165,413	..	..	3	..	2	1	..	..	1	..	2	..
	Lewisham	92,647	1	..	..	..	..	..	..	..	..	..	..	1
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	..	..
	Plumstead	52,436	..	..	..	..	..	..	..	..	..	..	..	..
	Lee	36,103	..	..	1	..	1	..	1	..	..	..	..	..
	Port of London	..	..	..	..	..	..	..	..	..	..	..	..	..

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population, 95).
‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136). Staple Inn (population, 21), and Furnival's Inn (population, 121).

ENTERIC FEVER—*continued.*

Weekly Statement, 2nd Quarter, 1897—*continued.* May 22.		May 29.		June 5.		June 12.		June 19.		June 26.		July 3.		Totals for 2nd Quarter, 1897.		Sanitary Areas.
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
38	8	47	10	43	8	36	5	44	2	36	8	32	5	464	76	London. (*Administrative County.*)
1	..	2	1	2	..	..	..	2	..	..	..	..	1	18	5	Kensington.
..	1	2	..	1	..	..	..	2	..	1	1	3	..	17	4	Fulham
1	1	..	..	1	..	1	..	1	..	..	..	1	..	14	1	Hammersmith
1	1	2	..	..	..	2	1	..	..	..	..	..	..	9	3	Paddington.
..	..	2	..	1	..	..	..	..	..	..	..	..	..	5	..	Chelsea.
1	..	..	1	..	..	1	..	..	..	2	..	1	..	9	2	St. George, Hanover Sq.*
2	..	..	..	..	..	2	..	..	..	1	..	..	..	9	..	Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. James, Westminster.
2	..	2	..	..	..	2	..	..	..	1	..	1	..	11	..	St. Marylebone.
1	1	..	..	..	..	1	..	..	..	..	..	1	..	7	1	Hampstead.
1	..	3	2	3	2	..	1	3	..	3	1	1	..	24	6	St. Pancras.
6	..	3	..	4	1	2	1	4	..	3	..	4	1	38	7	Islington.
1	..	..	..	2	..	1	1	1	..	..	1	..	1	5	4	St.Mary,StokeNewington
..	..	3	..	3	1	5	..	2	1	..	1	..	..	28	6	Hackney.
..	..	..	..	1	..	..	..	..	..	..	..	..	..	2	..	St. Giles and St. George Bloomsbury.
..	..	1	1	..	..	..	..	..	..	..	..	..	..	1	1	St. Martin-in-the-Fields.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Strand.†
1	1	2	..	..	..	..	..	..	..	..	..	..	..	5	1	Holborn.‡
..	..	..	..	3	..	1	..	1	..	3	1	1	..	12	1	Clerkenwell.
1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1	St. Luke, Middlesex.
1	..	..	1	..	..	..	..	..	..	..	..	..	..	1	1	London, City of.§
3	1	2	..	2	..	1	..	2	..	..	1	1	..	15	2	Shoreditch.
..	..	1	..	..	..	1	1	2	..	1	..	..	1	11	5	Bethnal Green.
..	..	..	..	1	..	..	..	..	..	..	..	..	..	3	..	Whitechapel.‖
1	..	..	..	..	..	..	..	..	..	1	..	..	..	2	..	St. George-in-the-East.
..	..	..	..	2	1	..	..	..	..	1	..	1	..	8	1	Limehouse.
..	..	4	..	2	1	..	..	..	..	3	..	2	..	15	2	Mile End Old Town.
1	..	3	1	3	..	1	..	7	1	4	..	1	..	30	3	Poplar.
..	..	..	..	1	..	1	..	1	..	..	..	2	..	5	..	St. Saviour, Southwark.
..	..	1	..	1	..	1	..	..	..	2	..	..	1	8	1	St. George, Southwark.
..	..	..	..	2	..	2	..	3	..	1	..	2	..	14	..	Newington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. Olave, Southwark.
1	..	2	1	..	..	..	..	1	..	..	..	2	..	9	2	Bermondsey.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	Rotherhithe.
1	..	2	..	3	1	4	..	1	..	3	1	2	..	32	4	Lambeth.
2	..	2	..	3	..	2	..	3	..	1	..	..	..	21	..	Battersea.
2	..	4	..	..	..	..	..	3	..	1	..	..	..	14	3	Wandsworth.
	..	3	1	1	..	1	..	1	..	1	1	2	..	21	4	Camberwell.
3	..	..	1	1	..	2	..	1	..	1	..	2	..	18	2	Greenwich.
3	1	..	..	..	1	..	..	2	..	1	..	1	..	8	3	Lewisham.
..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	Woolwich.
..	..	1	..	..	..	..	..	1	..	1	..	..	..	3	..	Plumstead.
..	..	..	..	..	..	..	..	..	..	..	..	1	..	4	..	Lee.
..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	Port of London

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§ Including Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

ENTERIC FEVER—*continued.*

	Sanitary Areas.	Population (1891).	Weekly Statement, 3rd Quarter, 1897.										
			July 10.		July 17.		July 24.		July 31.		Aug. 7.		Aug. 14.
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.
	London (*Administrative County*)	4.232,118	37	8	52	9	36	6	45	2	46	6	77
W. District.	Kensington	166,308	4	..	..	1	1	1	..	..	..	..	1
	Fulham	91,639	..	..	..	..	1	..	..	..	..	..	..
	Hammersmith	97,239	..	..	..	..	..	..	..	..	..	..	..
	Paddington	117,846	..	..	..	..	1	..	2	..	1	..	..
	Chelsea	96,253	..	..	..	..	..	..	1	1	3	..	2
	St. George, Hanover Sq.*	78,590	1	..	..	..	..	..	..	..	..	..	..
	Westminster	55,539	1	..	..	..	..	..	1	..	1	..	..
	St. James, Westminster	24,995	1	1	..	..	2	..	..	..	..	..	..
N. District.	St. Marylebone	142,404	2	..	1	..	..	1	1	..	..	1	3
	Hampstead	68,416	..	..	..	1	..	..	..	..	..	..	..
	St. Pancras	234,379	2	1	4	..	2	..	3	..	4	1	10
	Islington	319,143	4	..	5	..	8	3	3	..	2	..	4
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..	..	..	..	..	1
	Hackney	198,606	1	..	4	..	..	..	..	..	4	..	4
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	2	1	..	..	..	..	1	..	1
	St. Martin-in-the-Fields	14,616	..	..	1	..	..	..	..	..	..	..	..
	Strand†	25,217	1	1	..	..	1	..	..	..	..	..	1
	Holborn‡	34,043	..	..	..	..	..	..	1	..	1	..	2
	Clerkenwell	66,216	..	..	2	..	1	..	..	..	3	..	1
	St. Luke, Middlesex	42,440	..	..	..	..	..	..	2	..	..	..	1
	London, City of §	37,583	..	..	1	..	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	..	..	2	..	1	..	1	..	6	..	9
	Bethnal Green	129,132	5	..	2	1	..	..	5	..	..	..	1
	Whitechapel‖	74,420	2	..	4	..	2	..	3	1	..	..	1
	St. George-in-the-East	45,795	..	..	..	..	1	..	..	..	1	..	..
	Limehouse	57,376	2	1	2	..	..	..	..	..	1	..	2
	Mile End Old Town	107,592	..	1	1	..	..	..	2	..	2	1	2
	Poplar	166,748	3	1	3	2	2	..	2	..	3	..	4
S. District.	St. Saviour, Southwark	27,177	..	..	1	1	2	..	..	..	..	..	..
	St. George, Southwark	59,712	1	..	3	..	2	1	..	..	..	..	1
	Newington	115,804	..	1	..	..	..	..	3	..	1	..	3
	St. Olave, Southwark	12,723	..	..	..	..	..	..	..	..	..	..	2
	Bermondsey	84.682	..	..	2	..	1	..	2	..	1	1	..
	Rotherhithe	39,255	..	..	..	..	..	..	..	..	..	..	..
	Lambeth	275,203	..	1	3	..	1	..	1	..	3	..	5
	Battersea	150,558	..	..	..	..	..	..	..	..	3	1	5
	Wandsworth	156,942	1	..	1	..	3	..	1	..	2	..	1
	Camberwell	235,344	3	..	4	1	1	..	1	..	2	1	3
	Greenwich	165,413	1	..	2	1	3	..	7	..	1	..	5
	Lewisham	92,647	..	..	..	..	..	..	2	..	..	..	1
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	..
	Plumstead	52,436	2	..	1	..	..	..	..	..	..	..	..
	Lee	36,103	..	..	1	..	..	..	..	..	..	..	..
	Port of London	..	..	..	..	..	..	..	1	..	..	..	1

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* Including St. Peters, Westminster (population, 235).
† Including Middle Temple (population,

‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, Staple Inn (population, 21), and Furnival's Inn (population, 121).

ENTERIC FEVER—*continued.*

Weekly Statement, 3rd Quarter, 1897—*continued.*														Totals for 3rd Quarter, 1897.		Sanitary Areas.
Aug. 21.		Aug. 28.		Sept. 4.		Sept. 11.		Sept. 18.		Sept. 25.		Oct. 2.				
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
61	12	66	12	83	7	96	16	98	21	125	14	113	15	935	135	London. (*Administrative County.*)
1	..	2	..	4	..	1	..	8	1	2	..	7	1	31	4	Kensington.
1	..	1	..	1	..	..	..	1	..	..	..	1	1	6	2	Fulham.
1	1	..	..	4	..	1	..	2	..	1	..	2	..	11	1	Hammersmith.
..	..	1	..	1	..	2	..	1	..	1	1	1	..	11	1	Paddington.
1	..	..	..	1	..	5	..	1	1	1	..	1	..	16	2	Chelsea.
1	..	..	..	1	..	1	..	..	..	3	1	3	1	10	2	St. George, Hanover Sq.*
..	..	1	..	..	..	..	..	3	..	1	1	..	..	8	1	Westminster.
..	..	..	..	..	..	..	..	1	..	..	..	..	..	4	1	St. James, Westminster.
2	..	2	..	1	..	1	..	5	..	3	..	1	1	22	3	St. Marylebone.
..	..	..	..	..	..	..	..	..	..	2	1	1	..	3	2	Hampstead.
7	2	6	..	2	..	6	3	8	..	8	1	8	..	70	8	St. Pancras.
7	..	7	2	4	1	8	1	6	2	13	1	7	2	78	12	Islington.
..	..	..	..	2	..	..	..	1	1	2	..	2	..	8	1	St.Mary,StokeNewington
6	1	5	2	7	..	8	2	5	3	17	1	12	1	73	11	Hackney.
2	..	..	..	2	..	..	..	1	..	1	..	3	..	13	1	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	2	..	..	..	..	..	..	..	3	..	St. Martin-in-the-Fields.
..	..	..	1	..	..	3	..	..	1	..	..	1	..	7	3	Strand.†
..	1	..	..	..	..	..	..	..	1	1	..	2	..	7	2	Holborn.‡
5	..	3	1	..	..	2	1	..	1	2	..	1	..	20	3	Clerkenwell.
..	..	3	1	..	..	1	..	3	..	3	..	1	..	14	1	St. Luke, Middlesex.
..	..	..	..	1	..	1	..	2	..	..	1	3	..	8	1	London, City of.§
2	2	4	2	6	..	4	1	7	1	2	2	4	..	43	8	Shoreditch.
1	..	1	..	3	..	3	1	2	..	5	..	2	1	30	3	Bethnal Green.
1	..	1	..	1	1	1	..	2	..	1	..	2	..	21	2	Whitechapel.‖
1	..	..	..	1	..	2	..	1	..	1	..	2	..	10	..	St. George-in-the-East.
1	..	2	..	1	..	4	..	3	..	1	..	1	..	20	1	Limehouse.
3	..	3	..	2	1	2	1	2	..	5	..	2	1	26	6	Mile End Old Town.
3	..	5	..	4	..	4	1	6	..	4	1	9	1	52	6	Poplar.
..	..	1	..	..	..	..	..	..	..	1	..	..	..	5	1	St. Saviour, Southwark.
..	..	..	..	3	..	5	1	..	3	1	..	..	..	16	5	St. George, Southwark.
3	2	2	..	4	1	3	..	2	1	4	..	2	..	27	5	Newington.
..	..	..	..	2	..	1	..	..	..	..	1	..	..	5	1	St. Olave, Southwark.
..	..	..	..	2	1	2	..	4	1	4	..	1	..	19	3	Bermondsey.
..	..	1	..	..	..	2	..	..	..	3	..	2	..	8	..	Rotherhithe.
3	1	2	..	5	..	4	..	4	..	9	..	5	1	45	5	Lambeth.
1	..	..	..	2	..	4	1	6	1	..	1	2	1	23	6	Battersea.
..	1	4	1	3	..	4	..	2	1	5	..	5	1	32	4	Wandsworth.
1	..	1	..	1	1	2	..	6	2	6	..	5	..	36	5	Camberwell.
3	..	6	2	7	..	2	3	2	..	7	1	6	1	52	9	Greenwich.
1	1	1	..	1	1	1	..	1	..	2	..	1	..	11	2	Lewisham.
1	..	..	..	..	..	2	..	..	..	..	..	2	..	5	..	Woolwich.
	..	1	..	1	..	1	..	..	..	1	..	2	1	9	1	Plumstead.
	..	..	..	3	..	..	..	..	..	2	..	1	..	7	..	Lee.
	..	..	..	..	..	1	..	..	..	..	..	..	..	5	..	Port of London.

nding Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

	Sanitary Areas.	Population (1891).	ENTERIC FEVER—*continued.* Weekly Statement, 4th Quarter, 1897. Oct. 9.		Oct. 16.		Oct. 23.		Oct. 30.		Nov. 6.		Nov. 13.		No
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.
	London .. .. (*Administrative County*)	4,232,118	94	22	118	14	156	22	138	21	104	23	83	17	77
W. District.	Kensington	166,308	4	2	5	..	7	3	6	..	3	..	8	..	2
	Fulham	91,639	3	..	1	1	1	..	3	..	1	..	3	..	..
	Hammersmith	97,239	1	2	2	1	..	..	1	..	..	..	1	..	..
	Paddington	117,846	3	..	1	..	3	..	2	..	1	1	1	1	..
	Chelsea..	96,253	..	..	..	1	3	..	2	1	2	..	3	..	1
	St. George, Hanover Sq.*..	78,599	..	..	4	..	2	..	2	..	..	3	1	..	1
	Westminster	55,539	1	..	..	..	2	..	..	2	1	1	..	..	..
	St. James, Westminster ..	24,995	..	..	1	..	1	1	1	..	1	..	1	..	..
N. District.	St. Marylebone	142,404	7	..	3	..	4	..	1	2	5	..	3	..	1
	Hampstead	68,416	5	..	1	1	1	..	..	..	1	..	1	..	..
	St. Pancras	234,379	13	2	18	..	13	1	10	3	9	..	3	1	7
	Islington	319,143	4	2	6	..	17	1	10	1	8	2	6	2	7
	St.Mary, Stoke Newington	30,936	..	..	5	..	3	..	..	1	1	1	1	..	..
	Hackney	198,606	4	3	6	..	9	1	18	..	6	3	7	1	5
Central District.	St. Giles and St. George, Bloomsbury.	39,782	3	..	1	..	..	..	2	..	1	..	1	2	1
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	..	..	..	..	..
	Strand†	25,217	..	..	4	..	..	..	3	..	1	..	..	..	2
	Holborn‡	34,043	1	1	1	..	..	..	..	..	3	..	..	..	1
	Clerkenwell	66,216	2	..	..	..	3	..	..	..	4	..	..	1	..
	St. Luke, Middlesex ..	42,440	3	..	..	..	..	..	2	..	..	..	..	..	[illegible]
	London, City of§	37,583	1	1	1	1	3	1	2	..	..	1	..	..	..
E. District.	Shoreditch	124,009	2	..	4	2	8	1	2	..	2	..	1	..	[illegible]
	Bethnal Green	129,132	1	..	5	1	7	..	5	1	5	..	2	1	[illegible]
	Whitechapel‖	74,420	4	2	..	..	1	..	1	..	3	..	1	..	..
	St. George-in-the-East ..	45,795	2	1	2	..	2	3	3	1	6	..	2	..	[illegible]
	Limehouse	57,376	1	..	2	..	3	..	3	..	1	..	1	..	[illegible]
	Mile End Old Town ..	107,592	1	1	2	1	3	1	2	1	3	1	1	..	[illegible]
	Poplar	166,748	5	1	12	1	13	1	15	1	8	1	10	..	[illegible]
S. District.	St. Saviour, Southwark ..	27,177	..	..	..	..	..	..	..	..	..	..	1	..	..
	St. George, Southwark ..	59,712	1	..	2	..	1	..	1	..	..	2	2	1	..
	Newington	115,804	1	..	..	..	2	1	2	..	3	..	5	..	..
	St. Olave, Southwark ..	12,723	..	..	..	..	..	..	1	..	..	..	..	..	1
	Bermondsey	84,682	1	..	..	1	1	..	1	..	6	..	..	1	..
	Rotherhithe	39,255	1	1	1	..	1	1	..	..	1	..	1	..	1
	Lambeth	275,203	1	..	5	..	11	..	6	..	5	1	4	1	3
	Battersea	150,558	5	1	8	2	7	2	3	1	..	1	1	..	3
	Wandsworth	156,942	2	1	2	..	2	..	4	..	2	..	3	1	1
	Camberwell	235,344	6	1	6	1	12	1	14	3	5	2	3	..	8
	Greenwich	165,413	2	..	4	..	6	2	9	2	1	2	2	1	3
	Lewisham	92,647	2	..	1	..	..	..	..	..	1	..	2	1	1
	Woolwich	40,848	..	..	1	..	..	..	..	1	3	..	..	..	..
	Plumstead	52,436	1	..	1	..	3	..	1	..	1	1	..	1	..
	Lee	36,103	..	..	..	..	1	1	..	..	..	..	1	1	..
	Port of London	..	..	..	..	..	..	..	..	..	..	..	..	..	..

* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population

‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population,
Inn (population, 21), and Furnival's Inn (population, 121).

ENTERIC FEVER—*continued.*

Weekly Statement, 4th Quarter, 1897—*continued.*												Totals for 4th Quarter, 1897.		Grand Totals for Year 1897.		Sanitary Areas.
Nov. 27.		Dec. 4.		Dec. 11.		Dec. 18.		Dec. 25		Jan. 1, 1898.						
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
63	21	62	15	77	13	58	23	38	5	53	14	1,121	225	3,113	557	London. (*Administrative County.*)
2	..	3	1	3	..	1	..	2	..	1	1	47	7	117	21	Kensington.
2	..	1	..	1	2	1	..	1	..	.	1	18	4	53	12	Fulham.
1	..	2	..	1	..	..	2	..	..	1	..	10	5	45	8	Hammersmith.
1	..	..	..	2	..	2	..	..	..	1	1	17	3	46	9	Paddington.
..	2	2	..	..	1	1	..	..	..	..	..	14	6	52	14	Chelsea.
1	1	2	..	..	..	1	..	..	..	..	..	14	4	40	10	St. George, Hanover Sq.*
1	..	..	1	1	..	1	1	..	..	1	..	8	5	28	6	Westminster.
..	..	..	..	..	..	1	..	1	..	..	..	7	1	13	3	St. James, Westminster.
4	1	4	..	1	1	1	..	2	..	2	..	38	4	88	14	St. Marylebone.
..	..	..	..	..	..	..	..	1	..	..	..	10	1	32	5	Hampstead.
3	2	7	1	3	..	3	1	2	..	6	1	97	16	223	38	St. Pancras.
6	2	7	2	12	1	6	3	7	..	5	2	101	18	259	45	Islington.
1	..	1	..	2	..	..	..	..	..	1	1	15	3	37	10	St.Mary,StokeNewington
5	3	3	2	9	..	5	1	1	..	5	..	83	15	209	35	Hackney.
..	..	..	..	1	..	..	..	..	..	..	..	10	2	32	6	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	1	St. Martin-in-the-Fields.
..	..	1	..	..	..	..	1	..	..	1	..	12	1	20	4	Strand.†
1	..	..	..	1	..	1	..	..	1	..	..	9	2	25	5	Holborn.‡
3	2	1	..	..	..	..	..	2	..	2	..	17	4	63	11	Clerkenwell.
..	1	1	1	1	..	2	..	1	..	..	..	12	2	41	4	St. Luke, Middlesex.
..	..	..	..	..	1	1	..	1	..	..	..	9	5	23	9	London, City of.§
2	..	..	..	5	2	1	..	1	1	..	..	31	6	107	20	Shoreditch.
3	..	..	..	1	..	2	..	..	..	3	1	41	4	106	17	Bethnal Green.
3	1	1	..	1	..	1	..	2	..	1	1	19	4	55	8	Whitechapel.‖
1	..	..	2	1	..	..	..	..	..	2	1	23	8	43	10	St. George-in-the-East.
..	1	1	..	1	..	..	..	1	..	..	..	18	1	52	4	Limehouse.
4	..	4	1	..	2	2	2	..	..	..	..	25	11	83	23	Mile End Old Town.
2	1	2	1	7	1	6	3	2	1	3	2	92	15	196	30	Poplar.
..	..	..	..	..	..	..	..	..	..	..	..	1	..	16	2	St. Saviour, Southwark.
1	..	..	..	..	..	..	..	1	..	..	..	9	3	40	10	St. George, Southwark.
1	..	2	..	2	..	2	..	..	..	2	..	22	2	81	9	Newington.
..	..	..	..	..	..	..	..	..	..	..	..	2	..	10	1	St. Olave, Southwark.
1	..	..	..	2	..	3	3	1	1	..	..	16	6	62	13	Bermondsey.
1	..	..	..	..	..	1	..	..	..	1	..	9	2	24	2	Rotherhithe.
3	..	7	..	4	..	7	2	4	..	4	1	64	6	185	26	Lambeth.
1	1	..	..	..	..	..	..	1	..	3	..	32	9	93	19	Battersea.
2	..	5	..	1	1	1	..	..	..	..	..	25	6	98	16	Wandsworth.
..	2	1	2	9	..	2	3	1	1	3	..	70	16	151	31	Camberwell,
3	..	2	1	2	..	2	..	1	..	3	1	40	9	145	29	Greenwich.
2	..	2	..	1	..	..	..	..	..	1	..	13	1	46	7	Lewisham.
2	1	..	..	2	1	..	1	1	..	1	..	10	4	18	4	Woolwich.
..	..	..	..	..	..	1	..	1	..	..	..	9	2	25	3	Plumstead.
..	..	..	..	..	..	..	..	..	..	..	..	2	2	17	3	Lee.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	..	Port of London.

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ncluding Inner Temple (population, 96).

‖ Including Tower of London (population, 863).

SIMPLE CONTINUED FEVER.

Weekly Statement, 1st Quarter, 1897.

	Sanitary Areas.	Population (1891).	Jan. 9.		Jan. 16.		Jan. 23.		Jan. 30.		Feb. 6.		Feb. 13.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. (*Administrative County*)	4,232,118	..	..	..	..	2	..	4	1	1	..	..	..
W. District.	Kensington	166,308	..	..	..	..	1	..	..	1	1	..	..	..
	Fulham	91,639	..	..	..	..	..	..	..	..	..	..	..	..
	Hammersmith	97,239	..	..	..	..	1	..	..	..	..	..	..	..
	Paddington	117,846	..	..	..	..	..	..	..	..	..	..	..	..
	Chelsea	96,253	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Hanover Sq.* ..	78,599	..	..	..	..	..	..	..	..	..	..	..	..
	Westminster	55,539	..	..	..	..	..	..	..	..	..	..	..	..
	St. James, Westminster ..	24,995	..	..	..	..	..	..	..	..	..	..	..	..
N. District.	St. Marylebone	142,404	..	..	..	..	..	..	..	..	..	..	..	..
	Hampstead	68,416	..	..	..	..	..	..	..	..	..	..	..	..
	St. Pancras	234,379	..	..	..	..	..	..	..	..	..	..	..	..
	Islington	319,143	..	..	..	..	..	..	..	..	..	..	..	..
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..	1	..	..	..	..	..
	Hackney	198,606	..	..	..	..	..	..	..	..	..	..	..	..
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	..	..	..	..	..	..	..	..	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	..	..	..	..
	Strand†	25,217	..	..	..	..	..	..	..	..	..	..	..	..
	Holborn‡	34,043	..	..	..	..	..	..	..	..	..	..	..	..
	Clerkenwell	66,216	..	..	..	..	..	..	..	..	..	..	..	..
	St. Luke, Middlesex ..	42,440	..	..	..	..	..	..	..	..	..	..	..	..
	London, City of§	37,583	..	..	..	..	..	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	..	..	..	..	..	..	..	..	..	..	..	..
	Bethnal Green	129,132	..	..	..	..	..	..	..	..	..	..	..	..
	Whitechapel‖	74,420	..	..	..	..	..	..	..	..	..	..	..	..
	St. George-in-the-East ..	45,795	..	..	..	..	..	..	..	..	..	..	..	..
	Limehouse	57,376	..	..	..	..	..	..	..	..	..	..	..	..
	Mile End Old Town ..	107,592	..	..	..	..	..	..	..	..	..	..	..	..
	Poplar	166,748	..	..	..	..	..	..	..	..	..	..	..	..
S. District.	St. Saviour Southwark ..	27,177	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Southwark ..	59,712	..	..	..	..	..	..	..	..	..	..	..	..
	Newington	115,804	..	..	..	..	..	..	..	..	..	..	..	..
	St. Olave, Southwark ..	12,723	..	..	..	..	..	..	..	..	..	..	..	..
	Bermondsey	84,682	..	..	..	..	..	..	..	..	..	..	..	..
	Rotherhithe	39,255	..	..	..	..	..	..	..	..	..	..	..	..
	Lambeth	275,203	..	..	..	..	..	..	2	..	..	..	..	..
	Battersea	150,558	..	..	..	..	..	..	..	..	..	..	..	..
	Wandsworth	156,942	..	..	..	..	..	..	1	..	..	..	..	..
	Camberwell	235,344	..	..	..	..	..	..	..	..	..	..	..	..
	Greenwich	165,413	..	..	..	..	..	..	..	..	..	..	..	..
	Lewisham	92,647	..	..	..	..	..	..	..	..	..	..	..	..
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	..	..
	Plumstead	52,436	..	..	..	..	..	..	..	..	..	..	..	..
	Lee	36,103	..	..	..	..	..	..	..	..	..	..	..	..
	Port of London	..	..	..	..	..	..	..	..	..	..	..	..	..

* Including St. Peters, Westminster (population, 235).

† Including Middle Temple (population, 95).

SIMPLE CONTINUED FEVER—*continued.*																
Weekly Statement, 1st Quarter, 1897—*continued.*														Totals for 1st Quarter, 1897.		Sanitary Areas.
Feb. 20.		Feb. 27.		Mar. 6.		Mar. 13.		Mar. 20.		Mar. 27.		April 3.				
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
..	..	..	2	2	..	3	..	5	..	..	..	2	..	19	3	London. (*Administrative County.*)
..	..	..	..	..	..	1	..	..	..	..	..	..	..	3	1	Kensington.
..	..	..	..	..	..	..	..	3	..	..	..	..	..	3	..	Fulham.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Hammersmith.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Paddington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Chelsea.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George, Hanover Sq.*
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. James, Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Marylebone.
..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	Hampstead.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Pancras.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Islington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St.Mary,StokeNewington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hackney.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Martin-in-the-Fields.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Strand.†
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Holborn.‡
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Clerkenwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Luke, Middlesex.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	London, City of.§
..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	Shoreditch.
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	Bethnal Green.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Whitechapel.‖
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George-in-the-East.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Limehouse.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Mile End Old Town.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Poplar.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Saviour, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Newington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Olave, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Bermondsey.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Rotherhithe.
..	..	..	..	..	..	..	..	1	..	..	..	2	..	5	..	Lambeth.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Battersea.
..	..	..	1	..	..	1	..	1	..	..	..	..	..	3	1	Wandsworth.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Camberwell
..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	Greenwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lewisham.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Woolwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Plumstead.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lee.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Port of London.

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‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136), Staple Inn (population, 21), and Furnival's Inn (population, 121).

§ Including Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

	Sanitary Areas.	Population (1891).	SIMPLE CONTINUED FEVER—*continued.* Weekly Statement, 2nd Quarter, 1897. April 10.		April 17.		April 24.		May 1.		May 8.		May 15.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	London .. .. (*Administrative County*)	4,232,118	..	..	1	..	1	..	..	..	1	..	..	..
W. District.	Kensington	166,308	..	..	..	..	..	..	..	..	..	..	..	..
	Fulham	91,639	..	..	..	..	..	..	..	..	..	..	..	..
	Hammersmith	97,239	..	..	..	..	..	..	..	..	..	..	..	..
	Paddington	117,846	..	..	..	..	..	..	..	..	..	..	..	..
	Chelsea	96,253	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Hanover Sq.* ..	78,599	..	..	1	..	..	..	..	..	..	..	..	..
	Westminster	55,539	..	..	..	..	..	..	..	..	..	..	..	..
	St. James, Westminster ..	24,995	..	..	..	..	..	..	..	..	..	..	..	..
N. District.	St. Marylebone	142,404	..	..	..	..	..	..	..	..	..	..	..	..
	Hampstead	68,416	..	..	..	..	..	..	..	..	..	..	..	..
	St. Pancras	234,379	..	..	..	..	..	..	..	..	..	..	..	..
	Islington	319,143	..	..	..	..	1	..	..	..	..	..	..	..
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..	..	..	..	..	..	..
	Hackney	198,606	..	..	..	..	..	..	..	..	..	..	..	..
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	..	..	..	..	..	..	..	..	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	..	..	..	..
	Strand†	25,217	..	..	..	..	..	..	..	..	..	..	..	..
	Holborn‡	34,043	..	..	..	..	..	..	..	..	..	..	..	..
	Clerkenwell	66,216	..	..	..	..	..	..	..	..	..	..	..	..
	St. Luke, Middlesex ..	42,440	..	..	..	..	..	..	..	..	..	..	..	..
	London, City of§	37,583	..	..	..	..	..	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	..	..	..	..	..	..	..	..	..	..	..	..
	Bethnal Green	129,132	..	..	..	..	..	..	..	..	..	..	..	..
	Whitechapel‖	74,420	..	..	..	..	..	..	..	..	..	..	..	..
	St. George-in-the-East ..	45,795	..	..	..	..	..	..	..	..	..	..	..	..
	Limehouse	57,376	..	..	..	..	..	..	..	..	..	..	..	..
	Mile End Old Town ..	107,592	..	..	..	..	..	..	..	..	..	..	..	..
	Poplar	166,748	..	..	..	..	..	..	..	..	1	..	..	..
S. District.	St. Saviour, Southwark ..	27,177	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Southwark ..	59,712	..	..	..	..	..	..	..	..	..	..	..	..
	Newington	115,804	..	..	..	..	..	..	..	..	..	..	..	..
	St. Olave, Southwark ..	12,723	..	..	..	..	..	..	..	..	..	..	..	..
	Bermondsey	84,682	..	..	..	..	..	..	..	..	..	..	..	..
	Rotherhithe	39,255	..	..	..	..	..	..	..	..	..	..	..	..
	Lambeth	275,203	..	..	..	..	..	..	..	..	..	..	..	..
	Battersea	150,558	..	..	..	..	..	..	..	..	..	..	..	..
	Wandsworth	156,942	..	..	..	..	..	..	..	..	..	..	..	..
	Camberwell	235,344	..	..	..	..	..	..	..	..	..	..	..	..
	Greenwich	165,413	..	..	..	..	..	..	..	..	..	..	..	..
	Lewisham	92,647	..	..	..	..	..	..	..	..	..	..	..	..
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	..	..
	Plumstead	52,436	..	..	..	..	..	..	..	..	..	..	..	..
	Lee	36,103	..	..	..	..	..	..	..	..	..	..	..	..
	Port of London	..	..	..	..	..	..	..	..	..	..	..	..	..

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population, 95).

‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136), Staple Inn (population, 21), and Furnival's Inn (population, 121).

SIMPLE CONTINUED FEVER—*continued.*

Weekly Statement, 2nd Quarter, 1897—*continued.*

May 22.		May 29.		June 5.		June 12.		June 19.		June 26.		July 3.		Totals for 2nd Quarter, 1897.		Sanitary Areas.
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
..	1	1	..	1	..	..	..	1	..	..	2	1	..	7	3	London. *(Administrative County.)*
..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	Kensington.
..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	Fulham.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hammersmith.
..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	Paddington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Chelsea.
..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	St. George, Hanover Sq.*
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. James, Westminster.
..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	St. Marylebone.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hampstead.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Pancras.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Islington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Mary, Stoke Newington.
..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	Hackney.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Martin-in-the-Fields.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Strand.†
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Holborn.‡
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Clerkenwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Luke, Middlesex.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	London, City of.§
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Shoreditch.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Bethnal Green.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Whitechapel.‖
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George-in-the-East.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Limehouse.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Mile End Old Town.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Poplar.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Saviour, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. George, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Newington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Olave, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Bermondsey.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Rotherhithe.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lambeth.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Battersea.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Wandsworth.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Camberwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Greenwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lewisham.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Woolwich.
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	Plumstead.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lee.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Port of London.

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§ Including Inner Temple (population, 96).

‖ Including Tower of London (population, 868).

	Sanitary Areas.	Population (1891).	Simple Continued Fever—*continued.* Weekly Statement, 3rd Quarter, 1897. July 10. Cases.	July 10. Deaths.	July 17. Cases.	July 17. Deaths.	July 24. Cases.	July 24. Deaths.	July 31. Cases.	July 31. Deaths.	Aug. 7. Cases.	Aug. 7. Deaths.	Aug. 14. Cases.	Aug. 14. Deaths.
	London .. .. (*Administrative County*)	4,232,118	1	..	2	..	1	..	..	..	3	..	4	..
W. District.	Kensington	166,308	..	..	..	..	..	..	..	..	..	..	..	..
	Fulham	91,639	..	..	..	..	..	..	..	..	1	..	1	..
	Hammersmith	97,239	..	..	..	..	..	..	..	..	..	..	..	..
	Paddington	117,846	..	..	..	..	..	..	..	..	..	..	..	..
	Chelsea	96,253	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Hanover Sq *..	78,599	..	..	..	..	..	..	..	..	..	..	..	..
	Westminster	55,539	..	..	..	..	..	..	..	..	..	..	..	..
	St. James, Westminster ..	24,995	..	..	..	..	..	..	..	..	..	..	..	..
N. District.	St. Marylebone	142,404	..	..	..	..	..	..	..	..	..	..	..	..
	Hampstead	68,416	..	..	..	..	..	..	..	..	..	..	..	..
	St. Pancras	234,379	..	..	1	..	..	..	..	..	..	..	..	..
	Islington	319,143	..	..	..	..	..	..	..	..	..	..	..	..
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..	..	..	..	..	..	..
	Hackney	198,606	..	..	..	..	..	..	..	..	..	..	..	..
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	..	..	..	..	..	..	..	..	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	..	..	..	..
	Strand†	25,217	..	..	..	..	..	..	..	..	..	..	..	..
	Holborn‡	34,043	..	..	..	..	..	..	..	..	..	..	..	..
	Clerkenwell	66,216	..	..	..	..	..	..	..	..	..	..	..	..
	St. Luke, Middlesex ..	42,440	..	..	..	..	..	..	..	..	..	..	..	..
	London, City of§	37,583	..	..	..	..	..	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	..	..	..	..	..	..	..	..	..	..	..	..
	Bethnal Green	129,132	..	..	..	..	..	..	..	..	..	..	..	..
	Whitechapel‖	74,420	..	..	..	..	..	..	..	..	..	..	..	..
	St. George-in-the-East ..	45,795	..	..	..	..	..	..	..	..	..	..	..	..
	Limehouse	57,376	..	..	..	..	..	..	..	..	..	..	..	..
	Mile End Old Town ..	107,592	..	..	..	..	..	..	..	..	..	..	..	..
	Poplar	166,748	1	..	..	..	..	..	..	..	..	..	..	..
S. District.	St. Saviour, Southwark ..	27,177	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Southwark ..	59,712	..	..	..	..	..	..	..	..	..	..	1	..
	Newington	115,804	..	..	..	..	..	..	..	..	..	..	..	..
	St. Olave, Southwark ..	12,723	..	..	..	..	..	..	..	..	..	..	..	..
	Bermondsey	84,682	..	..	..	..	..	..	..	..	..	..	..	..
	Rotherhithe	39,255	..	..	..	..	..	..	..	..	..	..	..	..
	Lambeth	275,203	..	..	1	..	1	..	..	..	2	..	1	..
	Battersea	150,558	..	..	..	..	..	..	..	..	..	..	..	..
	Wandsworth	156,942	..	..	..	..	..	..	..	..	..	..	1	..
	Camberwell	235,344	..	..	..	..	..	..	..	..	..	..	..	..
	Greenwich	165,413	..	..	..	..	..	..	..	..	..	..	..	..
	Lewisham	92,647	..	..	..	..	..	..	..	..	..	..	..	..
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	..	..
	Plumstead	52,436	..	..	..	..	..	..	..	..	..	..	..	..
	Lee	36,103	..	..	..	..	..	..	..	..	..	..	..	..
	Port of London	..	..	..	..	..	..	..	..	..	..	..	..	..

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* Including St. Peters, Westminster (population, 235). † Including Middle Temple (population, 95).
‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 130), Staple Inn (population, 21), and Furnival's Inn (population, 121).

Simple Continued Fever—*continued.*																
Weekly Statement, 3rd Quarter, 1897—*continued.*														Totals for 3rd Quarter 1897.		Sanitary Areas.
Aug. 21.		Aug. 28.		Sept. 4.		Sept. 11.		Sept. 18.		Sept. 25.		Oct. 2.				
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
1	..	4	..	3	..	1	..	1	..	1	..	1	1	23	1	**London.** (***Administrative County.***)
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Kensington.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	**Fulham.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Hammersmith.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Paddington.**
..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	**Chelsea.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**St. George, Hanover Sq.***
..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	**Westminster.**
..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	**St. James, Westminster.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**St. Marylebone.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Hampstead.**
..	..	4	..	..	..	..	..	..	..	..	..	..	..	5	..	**St. Pancras.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Islington.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**St. Mary, Stoke Newington.**
..	..	..	..	1	..	1	..	..	..	..	..	..	..	2	..	**Hackney.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**St. Giles and St. George, Bloomsbury.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**St. Martin-in-the-Fields.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Strand.†**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Holborn.‡**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Clerkenwell.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**St. Luke, Middlesex.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**London, City of.§**
..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	**Shoreditch.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Bethnal Green.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Whitechapel ‖**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**St. George-in-the-East.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Limehouse.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Mile End Old Town.**
1	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	**Poplar.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**St. Saviour, Southwark.**
..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	**St. George, Southwark.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Newington.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**St. Olave, Southwark.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Bermondsey.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Rotherhithe.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..	**Lambeth.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Battersea.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**Wandsworth.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Camberwell.**
..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	**Greenwich.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Lewisham.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Woolwich.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Plumstead.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Lee.**
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**Port of London.**

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§ Including Inner Temple (population, 96).

‖ Including Tower of London (population 868).

	Sanitary Areas.	Population (1891).	Simple Continued Fever—*continued.*													
			Weekly Statement, 4th Quarter, 1897.													
			Oct. 9.		Oct. 16.		Oct. 23.		Oct. 30.		Nov. 6.		Nov. 13.		Nov. 20.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	
	London .. .. (*Administrative County*)	4,232,118	1	..	1	..	3	..	1	1	4	..	2	..	..	..
W. District.	Kensington	166,308	..	..	..	..	..	..	..	..	1	..	..	..	..	..
	Fulham	91,639	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Hammersmith	97,239	..	..	..	..	1	..	..	1	1	..	..	..	..	..
	Paddington	117,846	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Chelsea	96,253	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Hanover Sq.* ..	78,599	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Westminster	55,539	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. James, Westminster ..	24,995	..	..	..	..	..	..	..	..	..	..	..	..	..	..
N. District.	St. Marylebone	142,404	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Hampstead	68,416	..	..	..	..	..	..	1	..	..	..	..	..	..	..
	St. Pancras	234,379	..	..	1	..	2	..	..	..	..	..	..	..	..	..
	Islington	319,143	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Hackney	198,606	1	..	..	..	..	..	..	..	1	..	..	..	..	..
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Strand†	25,217	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Holborn‡	34,043	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Clerkenwell	66,216	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. Luke, Middlesex ..	42,440	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	London, City of§	37,583	..	..	..	..	..	..	..	..	..	..	..	..	..	..
E. District.	Shoreditch	124,009	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Bethnal Green	129,132	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Whitechapel‖	74,420	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. George-in-the-East .	45,795	..	..	..	..	..	..	..	..	..	..	1	..	..	..
	Limehouse	57,376	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Mile End Old Town ..	107,592	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Poplar	166,748	..	..	..	..	..	..	..	..	..	..	..	..	..	..
S. District.	St. Saviour, Southwark ..	27,177	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. George, Southwark ..	59,712	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Newington ..	115,804	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	St. Olave, Southwark ..	12,723	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Bermondsey	84,682	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Rotherhithe	39,255	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Lambeth	275,203	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Battersea	150,558	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Wandsworth	156,942	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Camberwell	235,344	..	..	..	..	..	..	..	..	1	..	..	..	..	..
	Greenwich	165,413	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Lewisham	92,647	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Woolwich	40,848	..	..	..	..	..	..	..	..	..	..	1	..	..	..
	Plumstead	52,436	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Lee	36,103	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Port of London	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

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* Including St. Peters, Westminster (population, 235).

† Including Middle Temple (population, 95).

SIMPLE CONTINUED FEVER—*continued.*

Weekly Statement, 4th Quarter, 1897—*continued.*												Totals for 4th Quarter, 1897.		Grand Totals for Year 1897.		San'tary Areas.
Nov. 27.		Dec. 4.		Dec. 11.		Dec. 18.		Dec. 25.		Jan. 1, 1898.						
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
..	..	1	..	1	..	2	..	..	..	..	..	16	1	65	8	London. (*Administrative County.*)
..	..	..	..	..	..	..	..	..	..	..	..	1	..	5	1	Kensington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	1	Fulham.
..	..	1	..	..	..	..	..	..	..	..	..	3	1	4	1	Hammersmith.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	Paddington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Chelsea.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	St. George, Hanover Sq.*
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Westminster.
..	..	..	..	1	..	..	..	..	..	..	..	1	..	2	..	St. James, Westminster.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St. Marylebone.
..	..	..	..	..	..	..	..	..	..	..	..	1	..	2	..	Hampstead.
..	..	..	..	..	..	..	..	..	..	..	..	3	..	8	..	St. Pancras.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	Islington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	St.Mary,StokeNewington.
..	..	..	..	..	..	..	..	..	..	..	..	2	..	5	..	Hackney.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Martin-in-the-Fields.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Strand.†
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Holborn.‡
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Clerkenwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Luke, Middlesex.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	London, City of.§
..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	Shoreditch.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	Bethnal Green.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Whitechapel.‖
..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	St. George-in-the-East.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Limehouse.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Mile End Old Town.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	Poplar.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Saviour, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	St. George, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Newington.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	St. Olave, Southwark.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Bermondsey.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Rotherhithe.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	..	Lambeth.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Battersea.
..	..	..	..	..	..	2	..	..	..	..	..	2	..	6	1	Wandsworth.
..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	Camberwell.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	Greenwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lewisham.
..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	Woolwich.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	Plumstead.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Lee.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Port of London.

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‡ Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136), Staple Inn (population, 21), and Furnival's Inn (population, 121).

§ Including Inner Temple (population, 96).

‖ Including Tower of London (population, 868)

	Sanitary Areas	Population (1891).	Typhus Fever. Weekly Statement, 1897. Feb. 20. Cases.	Totals for 1st Quarter, 1897. Cases.	Totals for 1st Quarter, 1897. Deaths.	June 26. Cases.	Totals for 2nd Quarter, 1897. Cases.	Totals for 2nd Quarter, 1897. Deaths.
	London .. .. *(Administrative County)*	4,232,118	1	1	..	1	1	..
W. District.	Kensington	166,308	..	..	..	..	..	..
	Fulham	91,639	..	..	..	..	..	..
	Hammersmith	97,239	..	..	..	..	..	..
	Paddington	117,846	..	..	..	..	..	..
	Chelsea..	96,253	..	..	..	..	..	..
	St. George, Hanover Sq.* ..	78,599	..	..	..	..	..	..
	Westminster	55,539	..	..	..	..	..	..
	St. James, Westminster ..	24,995	..	..	..	..	..	..
N. District.	St. Marylebone	142,404	..	..	..	..	..	..
	Hampstead	68,416	..	..	..	..	..	..
	St. Pancras	234,379	..	..	..	..	..	..
	Islington	319,143	..	..	..	..	..	..
	St. Mary, Stoke Newington	30,936	..	..	..	..	..	..
	Hackney	198,606	..	..	..	..	..	..
Central District.	St. Giles and St. George, Bloomsbury.	39,782	..	..	..	..	..	..
	St. Martin-in-the-Fields ..	14,616	..	..	..	..	..	..
	Strand†	25,217	..	..	..	..	..	..
	Holborn‡	34,043	..	..	..	..	..	..
	Clerkenwell	66,216	..	..	..	..	..	..
	St. Luke, Middlesex ..	42,440	..	..	..	..	..	..
	London, City of§	37.583	..	..	..	..	..	..
E. District.	Shoreditch	124,009	..	..	..	..	..	..
	Bethnal Green	129,132	..	..	..	..	..	..
	Whitechapel‖	74,420	1	1	..	..	..	..
	St. George-in-the-East ..	45,795	..	..	..	1	1	..
	Limehouse	57,376	..	..	..	..	..	..
	Mile End Old Town ..	107,592	..	..	..	..	..	..
	Poplar	166,748	..	..	..	..	..	..
S. District.	St. Saviour, Southwark ..	27,177	..	..	..	..	..	..
	St. George, Southwark ..	59,712	..	..	..	..	..	..
	Newington	115,804	..	..	..	..	..	..
	St. Olave, Southwark ..	12,723	..	..	..	..	..	..
	Bermondsey	84,682	..	..	..	..	..	..
	Rotherhithe	39,255	..	..	..	..	..	..
	Lambeth	275,203	..	..	..	..	..	..
	Battersea	150,558	..	..	..	..	..	..
	Wandsworth	156,942	..	..	..	..	..	..
	Camberwell	235,344	..	..	..	..	..	..
	Greenwich	165,413	..	..	..	..	..	..
	Lewisham	92,647	..	..	..	..	..	..
	Woolwich	40,848	..	..	..	..	..	..
	Plumstead	52,436	..	..	..	..	..	..
	Lee	36,103	..	..	..	..	..	..
	Port of London	..	..	..	..	..	..	..

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* Including St. Peters, Westminster (population, 235).
† Including Middle Temple (population, 95).

TYPHUS FEVER—*continued.* Weekly Statement, 1897—*continued.* Aug. 14.							TYPHUS FEVER—*continued.* Grand Totals for Year 1897.		Sanitary Areas.
	Totals for 3rd Quarter, 1897.		Oct. 23.		Totals for 4th Quarter, 1897.				
Cases.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
1	1	..	1	1	1	1	4	1	London. (*Administrative County.*)
..	..	..	..	..	..	..	..	..	Kensington.
..	..	..	..	..	..	..	..	..	Fulham.
..	..	..	..	..	..	..	..	..	Hammersmith
..	..	..	..	..	..	..	..	..	Paddington.
..	..	..	..	..	..	..	..	..	Chelsea.
..	..	..	..	..	..	..	..	..	St. George, Hanover Sq.*
..	..	..	..	..	..	..	..	..	Westminster.
..	..	..	..	..	..	..	..	..	St. James, Westminster.
..	..	..	..	..	..	..	..	..	St. Marylebone.
..	..	..	..	..	..	..	..	..	Hampstead.
..	..	..	..	..	..	..	..	..	St. Pancras.
..	..	..	..	..	..	..	..	..	Islington.
..	..	..	..	..	..	..	..	..	St.Mary,StokeNewington.
..	..	..	..	..	..	..	..	..	Hackney.
..	..	..	..	..	..	..	..	..	St. Giles and St. George, Bloomsbury.
..	..	..	..	..	..	..	..	..	St. Martin-in-the-Fields.
..	..	..	..	..	..	..	..	..	Strand.†
..	..	..	..	..	..	..	..	..	Holborn.‡
..	..	..	..	..	..	..	..	..	Clerkenwell.
..	..	..	..	..	..	..	..	..	St. Luke, Middlesex.
..	..	..	..	..	..	..	..	..	London, City of.§
..	..	..	..	..	..	..	..	..	Shoreditch.
..	..	..	1	1	1	1	1	1	Bethnal Green.
..	..	..	..	..	..	..	1	..	Whitechapel.‖
..	..	..	..	..	..	..	1	..	St. George-in-the-East.
..	..	..	..	..	..	..	..	..	Limehouse.
..	..	..	..	..	..	..	..	..	Mile End Old Town.
..	..	..	..	..	..	..	..	..	Poplar.
..	..	..	..	..	..	..	..	..	St. Saviour, Southwark.
..	..	..	..	..	..	..	..	..	St. George, Southwark.
..	..	..	..	..	..	..	..	..	Newington.
..	..	..	..	..	..	..	..	..	St. Olave, Southwark.
..	..	..	..	..	..	..	..	..	Bermondsey.
..	..	..	..	..	..	..	..	..	Rotherhithe.
..	..	..	..	..	..	..	..	..	Lambeth.
1	1	..	..	..	..	..	1	..	Battersea.
..	..	..	..	..	..	..	..	..	Wandsworth.
..	..	..	..	..	..	..	..	..	Camberwell.
..	..	..	..	..	..	..	..	..	Greenwich.
..	..	..	..	..	..	..	..	..	Lewisham.
..	..	..	..	..	..	..	..	..	Woolwich.
..	..	..	..	..	..	..	..	..	Plumstead.
..	..	..	..	..	..	..	..	..	Lee.
..	..	..	..	..	..	..	..	..	Port of London.

Including Gray's Inn (population, 253), Lincoln's Inn (population, 27), Charterhouse (population, 136), Staple Inn (population, 21), and Furnival's Inn (population, 121).

§ Including Inner Temple (population, 96). ‖ Including Tower of London (population, 868).

No. 1.

REPORT on the MORPHOLOGY and BIOLOGY of BACILLUS ENTERITIDIS SPOROGENES; on association of this Microbe with INFANTILE DIARRHŒA and with CHOLERA NOSTRAS; and on its relations with MILK, with SEWAGE, and with MANURE; by Dr. KLEIN, F.R.S.

The nature of the causes of diarrhœa in general, and of autumnal or infantile diarrhœa in particular, cannot yet, from a bacteriological point of view, be regarded as having been satisfactorily solved. It is true that there have been plenty of assertions as to the occurrence, in association with diarrhœa, of one or the other species of bacterium; but for the most part these assertions have been based on imperfect bacteriological methods, and generally the bacteria in question have been since shown to be saprophytes of the normal intestine. There remain indeed only two series of contentions in this sense which may be said to have for their basis good experimental evidence.

The first of these is by Lübbert (Zeitschrift f. Hygiene, xxii., p. 1), who in Flugge's laboratory subjected to a careful examination the various microbes described by Flugge (Zeitschrift f. Hygiene, xvii., p. 272) as commonly occurring in milk, and which form spores highly resistant to heat. He showed that some of these microbes have the power of decomposing and peptonising milk, and thus produce therein chemical substances which, when introduced into the alimentary canal of animals, cause toxic effects with diarrhœa. He justly concludes from these experiments that cow's milk, which is the main food of infants, is apt to contain at certain seasons (summer and early autumn), owing to the great capacity of these peptonising microbes for rapid multiplication, enough of their toxin to cause in the consumer symptoms of diarrhœa. According to this view, therefore, infantile diarrhœa is the result of a chemical poisoning, the poison being produced in milk before it is used for food by certain peptonising spore-bearing microbes. And since these spores, owing to their high resistance to heat, escape destruction when subjected for a considerable time (even over two hours) to boiling, it follows that the boiling of milk, as ordinarily practised, does not free the milk of these obnoxious toxin producers.

It cannot be denied that cases of infantile diarrhœa caused in the above way might, and probably do, occur; but it will hardly be maintained that this is the usual way in which diarrhœa is brought about, or that "chemical poisoning" is the explanation of the malady which is termed clinically and epidemiologically epidemic or autumnal infantile diarrhœa. For it has been strongly indicated by Dr. Ballard that autumnal diarrhœa is an infectious disease depending on soil in the first and on season in the second place; he has adduced facts tending to show that it is not solely a chemical intoxication, *i.e.*, caused by ingestion of ready made toxin, but oft-times an infection due to some microbe derived from a particular class of soil, and capable of multiplying within the animal body; that owing to the nature of the food of infants, the microbe generally finds its entrance to their bodies through milk; but also that infection may and often does occur through other decoctions and mixtures which infants receive as food.

The second and different cause of diarrhœa, of which we have definite experimental evidence, is that which has been quite recently discovered by Escherich (Wiener Klin Wochenschrift, 1897, No. 42).

It is a virulent streptococcus, producing in the infant general acute septicæmic infection, with severe congestion of the intestine and sanguineous bowel evacuations. But, although there can be no question as to the facts recorded by Escherich, such a cause, namely, infection by virulent streptococcus, cannot be thought of as playing any important part in our autumnal diarrhœa; the disease observed by Escherich is in its symptoms and pathology a definite acute septicæmia of which the diarrhœa, or dysentery, is a symptom; it is not comparable in any way to what is termed autumnal or infantile diarrhœa.

Nevertheless, we in this country, as the result of investigations carried on at the instance of the Local Government Board, are not without indication that the hypothetical diarrhœa microbe of Dr. Ballard, which has already been referred to, may after all have been identified.

In October, 1895, on the occasion of an epidemic outbreak of diarrhœa amongst patients of St. Bartholomew's Hospital, I isolated an anaërobic spore-bearing bacillus—bacillus enteritidis sporogenes—which, when injected subcutaneously into the guinea-pig, caused acute fatal disease with sanguineous exudation. It will be remembered* that the bowel discharges of the patients in question were characterised by containing blood, and, as Dr. Andrewes has shown (ibidem), the cause of this outbreak was associated with a particular milk supply. As a matter of fact from the milk that had been in question, the same bacillus enteritidis sporogenes was isolated. Further, and as was also pointed out in the Report of the Medical Officer for 1896-97 by Dr. Andrewes†, various sporadic cases of severe diarrhœa in adults having been examined by him after the method described in my former report, bacillus enteritidis sporogenes was discovered in the bowel discharges of most of these cases, but was not detectable in the evacuations of casual commonplace diarrhœa. And finally, I have since ascertained that in the intestinal evacuations of healthy individuals, tested by the same methods for the presence of the spores of this microbe, no positive result is obtained.

In these circumstances, and by direction of the Board, I next turned my attention to the bowel discharges, and bowel contents of infants who were affected with, or who had died from, typical autumnal diarrhœa such as is common in most years between July and October.

Before, however, proceeding to describe the results of this further investigation, I must needs describe, in greater detail than in my former report, the method of cultivation resorted to, and dwell, also in detail, on the cultural characters of bacillus enteritidis sporogenes, as well as on some definite experiments to which it was subjected.

MORPHOLOGY and BIOLOGY of BACILLUS ENTERITIDIS.

The method of cultivation of the bacillus in milk, incubated anaërobically, is not only a simple and trustworthy means of identifying it, but has proved to be of great value also in the demonstration of the spores of this microbe in a variety of materials to be described later on in this report. The procedure is as follows:—

A flake or a small particle of any material—fluid or solid intestinal contents, for instance—suspected to contain the spores of bacillus

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* Report of the Medical Officer of the Local Government Board, 1895–96, pp. 197–204.

† Report of the Medical Officer of the Local Government Board, 1896–97, pp. 255–262.

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enteritidis, is placed in a test tube containing 15-20 cubic centimetres of sterile milk. This is then heated to 80° C. for 10-15 minutes, whereby all non-sporing microbes in the milk are killed, and only the spores of aërobes or of anaërobes are left intact. The milk tube having been cooled, is placed under conditions ensuring an atmosphere devoid of free oxygen, namely, within a large cylindrical test tube (Buchner's cylinder) containing about two drachms of pyrogallic acid, to which is added about 2-5 cubic centimetres of strong liquor potassæ before the cylinder is closed by means of a well-fitting indiarubber stopper. The whole apparatus is then incubated at 37° C. Next day, or latest after 30 or 36 hours,* if the original material contained spores of bacillus enteritidis, the milk will be found changed in a characteristic manner.

The characters of this change, which I have described in my former report (1895-1896), are these:—A large number of gas bubbles in the upper layer of the milk (Fig. 6); bubbles in addition liberated in great abundance on shaking the tube, on exposing it to the light, or on sucking the fluid up into a pipette. The cream is torn or altogether dissociated by these gas bubbles, so that the surface of the medium is covered with stringy pinkish white masses of coagulated casein, enclosing a number of gas bubbles; meanwhile, the main portion of the tube, formerly occupied by the milk, contains a colourless, thin, watery, clear or slightly turbid whey, with a few casein lumps adhering here and there to the sides of the tube; and at the bottom of the tube are small casein coagula. On opening the tube, the fluid within it has a distinct aromatic smell of butyric acid; and on testing the whey with blue litmus paper, it is found that its reaction is distinctly acid. Under the microscope this fluid is found to contain numerous rods and cylinders, some connected in chains. Some rods are motile, others do not show motility. In aspect and in size the rods correspond to the bacillus enteritidis described and figured in my former report (1895-1896).

The rapid production by bacillus enteritidis of acid in milk culture is also shown by using, instead of ordinary milk, milk to which litmus has been added, such milk being of course blue, owing to its normal alkalinity. Incubating anaërobically an infected *litmus* milk culture, it is seen after a day or two that the milk has become completely deprived of its blue coloration. This is of course due to deoxydation or reduction of the litmus by the growth of the microbe. If the culture tube is now taken out of the Buchner cylinder and exposed to the air, the culture gradually reddens (by oxydation), the reddening beginning at the top of the culture fluid and gradually extending into the depth till all the fluid has become bright pink.

Pathogenic effect of bacillus enteritidis on rodents.

Milk cultures of the above general and microscopic aspects need to be tested as to their pathogenic action, for the reason that the bacillus butyricus of Botkin, which is not rarely found in milk and other materials, produces the same changes in milk culture as bacillus enteritidis. But while the former is altogether without any pathogenic action, when subcutaneously injected in considerable amount

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* As a rule this change is noticed before 24 hours are over; but when the number of spores (or material) originally introduced is very small, the change in the milk may not be pronounced before 30 or 36 hours.

(several cubic centimetres) into the guinea-pig or rabbit, bacillus enteritidis has a pathogenic action which varies from great virulence to a virulence many degrees less, according to the nature of the material from which the spores have been derived. The typical virulence is, as mentioned in my former report, exhibited if 1 cubic centimetre of the clear or slightly turbid whey of a typical* milk culture 1-2 days old causes, when injected under the skin of the groin of a guinea-pig of 200-300 grammes body weight, the following changes:—A few (2-3) hours after the injection there is in and about the groin a distinct soft swelling to be felt, which gradually extends on to the thigh and abdomen. About 6 hours after the injection, the animal is quiet, sits huddled up in a corner of the cage, refuses food, and the swelling is more pronounced. This condition increases rapidly, so that after 12 hours the animal's movements become slow and impaired, and generally after 16-18 hours the animal is lying on its side and is moribund. Usually—provided the above quantity has been injected—the animal is found dead in 18, 20, or at latest, 24 hours; in a few instances only is death postponed to the second or third day. In the great majority of instances, an animal injected about 11 or 12 o'clock midday, will be found very ill in the evening by 6 p.m., with extensive tumour in the groin abdomen and chest, and will be found dead and cold by 9 o'clock the next morning. On making a post-mortem examination, what strikes one first is the ease with which the hairs come off, or can be stripped off, from the thigh, groin, and flanks on the inoculated side, the skin underneath being green and gangrenous. On an incision being made through the skin it is found that the subcutaneous tissue over an extensive area—thigh, groin, abdomen, and even chest and neck—is either partially or totally gone, or dissolved, or is in gangrenous flakes; so that the skin appears partially or totally severed from the subjacent muscles of the thigh, groin, abdomen, and chest. The muscular tissue itself is a little injected and wet, and from it project numerous gangrenous shreds of partially dissolved muscular bundles. The solution of the muscular tissue of the abdominal wall is in some cases very pronounced, the tissues being in some places so thinned out that the coils of the intestines can be easily seen as through a thin membrane; in some cases the dissolution of the tissues has gone so far as to have produced a local opening of the peritoneal cavity, through which loops of the intestine project into the groin. Placing one of the above gangrenous shreds of the muscular tissue under the microscope, the destruction, granular disintegration, and solution of the muscular fibres can be easily made out. When, as is generally the case, the skin is *in toto* severed from the muscular tissue, there is a good deal of fat in the shape of fine droplets floating on the top of the copious sanguineous exudation present. The latter is a thick or thin viscid sanguineous fluid, smelling offensively, and containing flakes and shreds of disintegrating muscular fibres and connective tissue bundles.

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* It is an important point to note that for anaërobic virulent milk cultures, it is imperative to use milk, which has been only recently sterilised, *i.e.*, not more than 3-4 days previously. If milk be used which was sterilised a week or more before its use for culture purposes, it will be found to be not a good medium. Growth takes place in it and the milk is changed in the above manner in a day or two, yet the bacilli in the whey are few, and those present are not of normal size and aspect; moreover, such whey is considerably less virulent than that of a culture made with recent milk. It will be therefore understood that whenever in this report mention is made of anaërobic milk cultures, cultures in milk which has been recently bought and sterilised are signified.

Although the amount of this fluid is generally copious, it does not completely fill the space established between skin and muscle. This space is sometimes very extensive, so that a large amount of gas can accumulate there; and, as a matter of fact, before making an incision through the skin the presence of a considerable amount of gas can be recognized as a larger or smaller bulla between the skin and muscle, either in the flanks or on the abdomen.

As just stated the exudation is generally copious, in some cases very copious, in others less so; and its amount does not stand in any direct proportion to the rapidity of the disease or to the degree of the severance of the skin from the gangrenous muscle. In all cases, however, the exudation is in the fresh state crowded with bacilli, many possessing motility. This is particularly the case when the exudation is thin; when it is of a more viscid character, motility can be observed only in a few microbes. But in this case also, on dilution of the exudation with salt solution, many bacilli are seen to be motile. The bacilli are short rods, not more than 2-3 times as long as thick, or they are cylindrical; here and there also a few chains of rods can be found. But what is characteristic of bacillus enteritidis is the absence of the smooth unseptate filaments characterising the malignant œdema microbe of Koch. The bacilli of the exudation are rounded at their ends, and stain easily by Gram's method; thus, one minute's staining in gentian violet, followed by washing in absolute alcohol; then 4 minutes' decolorising in the normal solution of iodine iodide of potassium, followed by again washing in absolute alcohol, and in water, succeeded by drying and mounting, shows all the bacilli deeply stained—purple and black. So that one is justified in saying that bacillus enteritidis stains readily after Gram's method, even under severe treatment with iodine iodide of potassium (see Figs. 11, 12, and 13).

What I am here describing as to the anatomical appearances of the experimental animal, refers, be it understood, not to changes many hours after death, but to conditions which can be found a few hours after death, just before death, or even when the animal first shows distinct signs of illness, that is to say some few hours before death by the disease. The striking sanguineous exudation and the characteristic gangrene of the subcutaneous and muscular tissue are constant appearances. Further, these changes are not exhibited solely by animals injected with milk cultures containing bacillus enteritidis *plus* other microbes, but are equally seen in animals injected with pure milk cultures which have been started from the spores of the bacillus, or have been infected from a single colony of the microbe taken from an agar plate. I have over and over again obtained pure agar plate cultures of the bacillus anaërobically incubated, indifferently from a typical milk culture and from the exudation of a guinea-pig just dead from the disease; then from isolated single colonies in such a plate I have established subcultures in milk; and finally have, after 24 hours' anaërobic incubation, injected a guinea-pig with 1 cubic centimetre of the whey from such final milk culture. The result was always the same, and typical. In the post-mortem appearances, therefore, in the guinea-pig produced by bacillus enteritidis there is marked distinction between this microbe and Koch's bacillus of malignant œdema, a differentiation which will be specially referred to in detail later on.

If of a typical milk culture the whey is used in the same proportion for the rabbit as for the guinea-pig—namely, 1 cubic centimetre per 200-300 grammes body weight—the result is the same as regards virulence and as to post-mortem appearances. Sanguineous offensive exudation, full of the bacilli, is abundant, and there occurs extensive gangrene of the subcutaneous and muscular tissue. The white mouse is, however, less susceptible; an ordinary half to full grown animal requiring as much as ¼-½ a cubic centimetre of the whey to produce fatal result (with exudation and gangrene) in about 24-30 hours. Young guinea-pigs and young rabbits are more susceptible than adults, the latter, as I have said, occasionally surviving until the second or even the third day.

The subcutaneous exudation of a guinea-pig dead within 24 hours of injection with the whey is found more virulent than the milk culture itself; several drops of the exudation (¼-⅓ of a cubic centimetre) suffice to produce an acute fatal result in another guinea-pig. Milk cultures made with spores derived from different materials are not necessarily of equal virulence, inasmuch as the fatal issue in some cases is considerably delayed. This matter will be referred to more in detail later on.

As was mentioned in my former report,* *intraperitoneal* injection of fatal doses of whey (fatal, that is, on subcutaneous injection) produce a greatly accelerated disease; the animals become very ill in so short a time as 4 hours, and death ensues in about 8 hours. On post-mortem examination, the peritoneum and the intestines are found extremely congested; in the small intestine, there is copious fluid gelatinous sanguineous exudation; the peritoneal cavity contains also abundance of viscid sanguineous exudation full of the bacilli, which form numerous chains (Fig. 21); many of the bacilli—singly, in short and in long chains—are less rounded at the ends, some almost square cut; many of them are thicker than those of the subcutaneous exudation, and there are also degenerated chains in which only the empty swollen sheaths of the bacilli are left.

Occasionally, but not frequently, there is, in guinea-pigs dead after subcutaneous exudation, also peritonitis with sanguineous exudation and congestion of the small intestine; but this only occurs when the action of the bacilli is extremely virulent, and when the muscular coat of the abdominal wall shows much gangrene and dissolution.

When the quantity of whey or of other culture is small and subfatal, the animal shows at first the soft swelling and general illness, as in the above cases. But the swelling is less extensive, and in two or three days becomes firmer, while the general condition of the animal by this time is so much improved that it becomes again lively and feeds well. In these cases, as a rule, the subcutaneous local disease leads to ulceration of the skin, which ultimately completely heals up.

General distribution of bacillus enteritidis in the body of the experimental animal.

The subcutaneous *exudation* in the acute fatal cases is, as has been already said, always densely crowded with the bacilli. If the post-mortem examination is put off for several hours—6 to 24 or more—there are often found bacilli in which spores are present, either as small imperfectly oval glistening bodies, or as fully formed large egg-shaped glistening bodies thicker than the bacilli themselves (Figs. 11 and 14). These ripe spores are either still contained each within a bacillus—generally near its end, occasionally only at its middle part—or they are more or less free, at any rate there is attached to them at one or both ends a small remnant only of the original bacillary substance. In some cases the formation of spores in some of the bacilli is noticeable as early as six hours after death, but in others, even 24 hours after death, spores are found only sparingly.

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* Report of Medical Officer, 1895-96, p. 203.

Examining the abdominal or thoracic *muscle* in sections, after hardening and staining, it is seen that the bacilli are limited to the outer layer only, *i.e.*, the one that was in apposition with the subcutaneous tissue. Here, in this outer layer, they are found in large numbers as shorter or longer rods, not as filaments, and they penetrate between the muscle fibres only very sparingly and to no great depth. (Fig. 22).

The *spleen* is not enlarged, and is not very juicy; on the contrary its tissue is rather dry. Film specimens or sections of spleen, if the examination is made shortly after death, show few rods; but if the animal is allowed to remain unopened after death for 12-24 hours, examination of film specimens or sections of spleen show in some parts the bacilli very abundantly, but always as short or long rods, not as threads.

The examination of the *liver* in sections shows scarcely any bacilli amongst the liver tissue; and if present, chiefly in blood vessels. Only on the free surface adhering to the outer capsule are there found a few rods. Twenty-four hours after death, the bacilli are to be found within the liver substance, but always only very sparingly.

Similarly sections through the *kidney* show the bacilli as short rods only few and far between. Twenty-four hours after death they are oftener to be met with in some of the blood vessels of the cortex and medulla, but on the whole sparingly.

These facts harmonise well with the observations recorded in my former report, viz.: that the circulating *blood* tested by culture, shortly after death, contains the bacilli only very sparingly; 24 hours later they may occasionally be found even in film specimens made of the heart's blood (Fig. 23).

General morphological and cultural characters of bacillus enteritidis.

The microbe obtained from a typical milk culture or from the exudation of an animal dead of the disease induced by it, exhibits shorter or longer rods, measuring between 1·6 and 4·8 μ in length. Few are longer than this, though they may form short chains. Their thickness is 0·8 μ. In respect of length and thickness they approach bacillus anthracis, and they are distinctly and markedly thicker than the bacilli of malignant œdema; moreover, the latter, as mentioned already, in the exudation and in the spleen of an infected (lethally) animal, form characteristic long smooth threads. Upon the whole bacillus enteritidis in respect of length and thickness, and in respect of spores, stands nearest the bacillus of symptomatic charbon. From this, however, as will be pointed out later on, it differs in respect of physiological action.

As mentioned in my first report, bacillus enteritidis readily forms spores; in liquefying gelatine cultures, in serum cultures, and also

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in the subcutaneous exudation spores are under certain conditions readily formed. They appear first as minute glistening globules, generally near one end of the bacillus, gradually increasing in size, and then become oval bodies, 1·6 in length and as much as 1·0 μ or even 1·2 μ in thickness; so that as it approaches ripeness a spore gradually surpasses the rod in which it is situated in thickness. When stained after the manner usual for spore-bearing bacilli: viz., in boiling fuchsin, and then in methylblue, the spores become coloured dark pink, while the bacillary substance is stained blue. Figs. 10, 16, and 17 are reproductions of photograms of spore-stained specimens.

In serum cultures or in the subcutaneous fluid, the spores develop as a rule near the ends of the rods (Fig. 16); but in liquefying gelatine cultures, spores, when they make their appearance, seem in most bacilli located near the middle of the rods (Fig. 17). The bacilli in which spores develop are always thicker than the non-sporing forms; the thickest bacilli of this kind were found in the intestinal contents and in the evacuations of persons dead from cholera nostras or affected with epidemic diarrhœa. In such evacuations bacilli containing spores are about twice the thickness of a typical non-sporing rod. So also with regard to the spores themselves; the fully formed spores in the intestinal contents of such cases are markedly thicker and longer than when formed in serum cultures or in the subcutaneous exudation of the guinea-pig.

Most spores develope singly near the one end of a given bacillus. Occasionally, though infrequently, in serum cultures or in subcutaneous exudation, as well as in liquefying gelatine cultures, they are in the middle; but this is not quite certain, and may be rather apparent than real, for, if after or near the completion of the spore, a greater part of the original bacillary substance breaks away, the spore may appear as if situated in the middle of a short rod. As a matter of fact, on careful examination of the developing spores these can be found only near one end of the bacillus. In this respect then, viz.: of excentric position of the spore, bacillus enteritidis is allied to the bacillus of symptomatic charbon, but is different from that of malignant œdema, in which most spores are found in the middle part of the bacillus.

The spores are capable of germinating into bacilli, which by repeated division produce a new crop of virulent microbes. Drying, heating to 100° C. for 1 minute, does not interfere with the power of the spores to live and to germinate. Two minutes', certainly 3 and 4 minutes', boiling does, however, kill the spores formed in artificial cultures. But spores from the intestinal contents are more resisting. From experiments made by Dr. Wild in my laboratory, it appears that these—spores from the intestinal contents of cases of epidemic diarrhœa (March 6th, 1898) in St. Bartholomew's Hospital—can stand immersion (of an infected milk tube) in water at 110° C. for as long as 6 minutes or even 10 minutes.

The simplest method of obtaining good and virulent spores is this: After an animal is dead as the result of the subcutaneous injection of a fatal dose of the whey of a typical milk culture or of several drops of the subcutaneous exudation, the malodorous sanguineous subcutaneous exudation is drawn up into sterile capillary pipettes, which when full are sealed at both ends and placed in the incubator at 37° C., for two, three or more days; or, better still, the subcutaneous exudation is transferred to a small sterile test tube, which is plugged with sterile cotton wool, and then placed in a Buchner cylinder, tightly closed, and incubated anærobically at 37° C., for two or three days. By this time, in each instance, an abundance of fully formed spores will, under the microscope, be found in the exudation. Both these methods are useful (Figs. 10 and 15); and I have in this way been able to obtain and to preserve fluids rich in spores as stock, spores which, as subsequent experiments proved, retained their power to germinate and to form virulent and typical milk cultures for very many months. I have, to give one example, only recently (February, 1898) had occasion to open a sealed capillary pipette filled with the subcutaneous exudation of a guinea-pig dead in November, 1896, and to test the spores contained therein, and I found that they had retained to the full their capacity to produce typical and virulent milk culture. But I must also add that this is not invariably the case, since I have other samples, in which the spores, although living, did not give rise to typical and virulent milk cultures. To this important point I shall have to return more fully later on.

Another useful way of obtaining spores is to cultivate the microbe on solidified blood serum. On this medium the growth of the bacillus at 37° C. is copious, and the formation of spores sets in in 2-3 days, so that the whole culture by the end of a week or ten days is one mass of free and fully formed active spores. Blood serum solidified with slanting surface in a test tube, is inoculated on its surface with material from a typical milk or other culture, or with subcutaneous exudation, and is then placed in a Buchner cylinder and incubated at 37° C. As just mentioned, after 2 days' incubation numerous bacilli are met with that contain at one end a small, young, or even a fully formed large oval, spore. The serum is gradually liquefied, so that by the end of a week or ten days almost the whole of the nutrient medium is found converted into a turbid, slightly greenish or greenish grey fluid, in which flocculi and small particles of undissolved serum are suspended. The culture, on the tube being opened, has the same offensive smell as the subcutaneous fluid from the injected animal, for as a matter of fact the gangrene and dissolution of the subcutaneous and muscular tissues, above referred to, is due to the same peptonising action of the bacilli on these tissues as on the solidified serum; the fluid in both instances has a strong alkaline reaction, contains peptonised albumen and smells offensively. The spores formed in serum cultures retain their germinating power and generally their ability to set up typical virulent milk cultures. Not infrequently, however, they undergo a change, which leads to their losing the power of producing typical milk cultures, so that such cultures may exhibit a distinctly decreased virulence, or even absence of virulence.

The microbe grows well in agar to which 2 per cent. of grape sugar has been added. In subcultures in this medium grown anaërobically it rapidly forms copious gas bubbles, by which the agar becomes split up and torn in different directions. The gas production is so great that not seldom in a test tube originally half filled with the medium, after a few days' incubation at 37° C., the agar is driven up to the cotton wool which closes the mouth of the tube. The colonies in the depth of the agar are round, white in reflected, brown and granular in transmitted light. The agar is not liquefied by the growth, and the bacilli do not form spores in it. Of a more characteristic aspect are the colonies which develop on the surface of agar in anaërobic plates. The agar used in the plates is grape sugar agar, but to it is added 0·5 per cent. formate of soda, as is employed for anaërobes in general (Kitasato and Weyl).

The simplest method of making anaërobic agar plates, one that always yielded positive results, is this:—The formate sugar agar is melted over the flame and then poured out into a small plate dish. After the agar has set, a drop of subcutaneous exudation of an experimental guinea-pig, or a drop of spore fluid from a serum culture, or a drop of the whey of a recent typical milk culture, is diluted in a sterile watch glass with a small quantity ($\frac{1}{2}$-1 cc.) of sterile salt solution. A sterilised platinum spatula (forming an angle with its stem) fastened (melted) in a glass rod, is dipped into the dilution, and then is drawn over the surface of the set agar in the plate dish, so as to rub the fluid adhering to the spatula uniformly over the whole surface of the agar. Then the plate dish is closed with its cover, and placed on a small wire triangle above a smaller and deeper glass dish, set upon a ground glass plate, containing a sufficient quantity of pyrogallic acid. A sufficient quantity of liquor potassæ is added to the pyrogallic acid in the lower glass dish, and the whole apparatus is then covered with a small bell glass, the polished free rim of which has been previously well smeared with a mixture of about equal parts of vaseline and paraffin (mixed by heat in a porcelain dish) so as to ensure the bell glass, on being well pressed down on the ground glass plate, an air-tight seal.

Having been incubated at 37° C. for a day or two, the agar plate shows numerous characteristic colonies; many isolated, others in some parts confluent, according to the greater or lesser dilution of the material with the salt solution. In this way it is easy to ascertain whether a milk culture, or the exudation from an experimental animal, is or is not a pure culture of the microbe; and further it is easy to make pure subcultures from a single isolated typical colony. The colonies of the bacillus enteritidis sporogenes on agar are circular, flat, moist, grey and translucent. Examined under a magnifying glass, each colony is a little thicker and less transparent in the middle part, thinned out and more transparent in the marginal portion; at the same time the colony is distinctly granular, the granules being placed closer and denser in the middle part, and less close in the marginal part. Figs 4 and 5 illustrate these points well.

Examined under the microscope, a particle of a recent colony (1-2-3 days old) is seen to be made up of distinctly cylindrical, more or less uniform rods (see Figs. 19 and 20) of a thickness which is very little less than that of bacillus anthracis, and, as a rule, a little greater than that of rods of the bacillus from subcutaneous exudation or from a typical milk culture. No spores are formed in the bacilli on such an agar plate. Moreover, if the plate is kept for a week or ten days the bacilli die and no further subcultures can be made with them. But during the first three or four days subcultures in milk, made from an agar colony, always prove typical and virulent.

The cultural characters of the bacillus enteritidis sporogenes in sugar gelatine and milk have been already described in my former report, but certain additional interesting points which have been since ascertained are dealt with under the following headings:—

(1) Gas production, liquefaction, and spore formation; (2) attenuation in relation to typical and atypical milk cultures.

1.—As mentioned in my former report, the bacillus enteritidis sporogenes, like some other known pathogenic anærobes, *e.g.*, the

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bacillus of malignant œdema, and the bacillus of symptomatic charbon, is a microbe which liquefies (peptonises) grape sugar gelatine, and forms therein gas; and, as also stated, bacillus enteritidis liquefies the gelatine rapidly, the liquefied gelatine remaining clear, while at the bottom of the liquefied medium a granular floccular mass of growth makes its appearance. Now, when spores of this bacillus from any source—whether from serum cultures or gelatine cultures, or from incubated subcutaneous or intraperitoneal exudation—are planted in sugar gelatine, which is then heated to 80° C. for 10-15 minutes, and afterwards cooled, sealed, and incubated at 20-21° C., it is noticed, after 24 hours, that there are fine dot-like colonies scattered in the solid gelatine, except in the upper parts of the medium, which remain free of them. According to the amount of spore material introduced, these colonies may be closely placed, or may be isolated and at considerable distances from each other. For accurate study of the individual colonies it is of course preferable to introduce only a limited number of spores; which is easily achieved by diluting the spore material with sterile saline solution, previous to its introduction into the sugar gelatine tube.

Examining the dot-like colonies under a glass it can be ascertained that they are commencing to liquefy the gelatine by the end of 24 hours; after a further 24 hours' incubation, the colonies have considerably increased in size, being now very conspicuous to the unaided eye as uniform spherical, finely granular, translucent masses of liquefied gelatine, surrounded by the solid transparent medium (Figs.1, 2, and 3). The liquefaction proceeds now rapidly; the liquefied colony being translucent, and uniformly slightly turbid, except at the lowest part where there is a mass of coarser granules. In the early aspect of the liquefying colonies in sugar gelatine there is a marked difference between those of the typical bacillus enteritidis, and those of the typical bacillus of malignant œdema. The early liquefying colonies of this latter contain in their centre a conspicuous opaque granule, or mass, around which the liquefaction proceeds, and which is still noticeable in the centre of the colony even after the liquefaction has been going on two or three days; and this same central opaque mass in the liquefying growth, is also noticeable in the stab culture in sugar gelatine. In the case of typical bacillus enteritidis, there is no central opaque mass present either in the isolated colonies or in the liquefying stab culture, the whole growth being uniform and fairly translucent. It is, however, necessary, to add that there exist distinct differences in the rate of liquefaction between the spores of the bacillus enteritidis derived from different materials, as also between spores of different generations of subcultures from the same stock; and that as soon as the spores of the microbe undergo attenuation, the liquefying colonies in subculture in sugar gelatine do show the central granule which characterises the colonies of the bacillus of malignant œdema.

A point of great interest as regards the liquefaction (peptonisation) of gelatine by the bacillus enteritidis, has been mentioned in my former report, viz. : that if from the early appearance of the colonies in the sugar-gelatine there is rapid and copious formation of gas bubbles, by which the gelatine becomes greatly dissociated and torn, there is for considerable time afterwards no appreciable liquefaction, and no spore formation. Liquefaction, in such case, starts very late—after 5, 6, 8, or more days—and proceeds very slowly indeed. On the other hand, if no gas bubbles appear at the outset, the colonies produce rapid and copious liquefaction and spore formation. Another interesting point is this: If rapidly liquefying colonies make their appearance in the sugar gelatine, it may be taken for granted that these colonies started from spores; for if the bacilli, as such, without admixture of spores, are implanted into the gelatine, the resulting colonies are non-liquefying, or liquefy only late, and very slowly. As illustrations of these propositions, I will mention the following experiments:—

Spores of bacillus enteritidis were planted in sterile milk tubes, which, after having been heated to 80° C. for 10-15 minutes, were incubated anaërobically at 37° C. in a Buchner tube. After 24-36 hours the milk was typically changed, and its whey contained numerous bacilli as sporeless rods. The same condition was maintained during subsequent days, certainly for a week. If during this time some of the whey was put into sugar gelatine or into sterile milk, heated for 10 minutes at 70-75° C., and then incubated in ordinary course, no growth occurred; sufficient proof that all the bacilli, being sporeless, had been killed by the preliminary heating. If on the other hand, some of the same whey was inoculated into sugar gelatine, which having been melted and shaken, was incubated without being heated to 70° C., abundant growth was the result. But such growth consisted of round colonies which did not liquefy the gelatine; they were white in reflected, opaque and brown in transmitted light. In this non-liquefying state, the colonies remained for many days. Now from these non-liquefying colonies subcultures were set up in milk, and it was seen that such milk became changed after incubation for 24-36 hours in the typical fashion, and that its whey—full of the bacillus—proved virulent in the normal way when injected subcutaneously into the guinea-pig. So that in the non-sporing state, bacillus enteritidis forms non-liquefying, but in the sporing state produces rapidly liquefying, colonies. The proof is clinched if in the subcutaneous exudation of the last guinea-pig of such series as the above, spores are, by anaërobic culture, allowed to develop—as described on a former page—and if these spores when ripe, *i.e.*, fully formed and free, are transferred to sugar gelatine, which is heated at 80° C. for 10-15 minutes, and then incubated, as mentioned above. The result will be always rapidly liquefying colonies. I have made a large number of experiments in this direction with bacilli in the non-sporing state, from fresh subcutaneous exudation, from recent typical milk cultures, from single colonies of anaërobic agar plates, and I have compared them with spores of the bacillus; so that I can assert with certainty that the former produce in sugar gelatine colonies that do not liquefy, or which liquefy at a late date and very slowly; whereas, the latter—spores—produce rapidly liquefying colonies, unless as mentioned above, there should be from the outset rapid formation of gas bubbles.

I have set side by side sugar gelatine cultures of both sets, and it is extremely difficult for any one not knowing the above explanation, to believe that in both we have to deal with the same microbe: one set of sugar gelatine containing an abundance of round non-liquefying opaque granular colonies, the other containing clear rapidly liquefying spheres. And yet both sets were started originally from the same single colony arising in an anaërobic agar plate: the one set of sugar gelatine having then been directly inoculated with the non-sporing bacilli of a typical virulent milk culture, the other set directly with the spores that had been formed in a serum culture.

The bacillus enteritidis sporogenes, if used in the form of spores, forms then rapidly liquefying clear colonies in sugar gelatine, but if used in the bacillary non-sporing state, it forms non-liquefying growth, or a growth which is very late in liquefying the medium, and does so very slowly. This different behaviour, as regards its power to peptonise (liquefy) gelatine, of the same microbe in its vegetative state and in its seed state, explains several of the results obtained and described by Dr. Andrewes in his report for 1896-1897.* Dr. Andrewes in this report mentions "varieties" of the bacillus enteritidis obtained by him from bowel discharges of some of the diarrhœa cases he examined; and he considered them varieties for the reason that when transferred from typical virulent milk culture to sugar gelatine they produced non-liquefying colonies, whereas the typical bacillus enteriditis produces liquefying colonies. But on further examination of these same "varieties" I find that if they are allowed to form spores they behave exactly in the same way as the spores of the typical bacillus enteritidis, *i.e.*, they form liquefying colonies; and on the other hand that, if non-sporing bacilli of the typical bacillus enteritidis (*e.g.*, from typical milk culture) are used, they produce non-liquefying colonies in the sugar gelatine similar to those of the "varieties." So that there is no justification for considering Dr. Andrewes' samples "varieties" in the generally accepted sense of the term.

2.—There is an important change which the spores of the bacillus enteritidis may undergo spontaneously or in process of culture.

If in a milk culture anaërobically incubated there appears the typical change repeatedly mentioned, viz.: rapid and copious formation of gas by which the cream is dissociated, with separation of the milk into casein flocculi (on the top, sides or bottom of the tube), and into a large amount of colourless, thin, watery, clear or slightly turbid whey, which has a distinct smell of butyric acid and which gives a distinct red colour in blue litmus; and if further the whey (containing abundance of non-sporing rods) when injected subcutaneously into the groin of a guinea-pig (1 cubic centimetre of whey per 200-300 grammes guinea-pig) causes death in 18 to 24, or latest 30 hours, with sanguineous malodorous exudation and extensive gangrene of the subcutaneous and muscular tissues of the groin abdomen and chest, it may be taken for granted that bacillus enteritidis is in question. But if, on the other hand, an anaërobic milk culture having become changed typically in precisely the same way as the above, its whey (containing numerous bacilli), be found on injection into a guinea-pig to be quite harmless (producing not even a local swelling), it may be taken for granted that the microbe present in the milk is not bacillus enteritidis, but most probably the non-pathogenic bacillus butyricus of Botkin. For according to my experience these are the only two anaërobic sporing microbes which morphologically and in milk culture resemble each other, both producing the same change in milk. But they are, as above said, easily distinguished from one another by animal experiment.

Now, working with the spores of bacillus enteritidis, it is sometimes found, that after several transferences from gelatine culture to gelatine culture, or from serum culture to serum culture, the spores fail to cause the above typical change in the milk. Sometimes, too, the spores in subcutaneous exudation, sealed in capillary pipettes and incubated, also fail in the above fashion. Thus, though I have had serum cultures, as also sealed and incubated subcutaneous exudation of guinea-pigs that had died of the typical disease, the spores in which maintained to the full their cultural and pathogenic characters during many months, also I have had spores, which though at first normal culturally and physiologically, sooner or later—some after only one or two transferences—lost their power to cause the typical change in the milk, and lost also their pathogenic action either considerably or practically altogether. What the cause of this change is, I am unable to say. I can only state the fact, and that sometimes spores undergo this change rapidly, in other instances very slowly. At first I was inclined to think that the enteritidis spores in the fluids in question had been crowded out by another sporing non-pathogenic anaërobic microbe not causing the typical change in the milk. But I soon had to give up this suspicion, for I ascertained that the change occurred gradually, and could be traced through a number of intermediate stages.

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* Report of the Medical Officer of the Local Government Board, 1896–97, pp. 261–262.

As mentioned above, sometimes at an early, sometimes at a late stage of incubation anaërobically of subcutaneous exudation, of serum, or of gelatine culture, the spores therefrom placed in milk which, after heating to 80° C. for 10-15 minutes, is incubated in a Buchner tube at 37° C., produce no change at all in the milk for the first two days. Not until the third or fourth day is it noticed that under the unchanged layer of cream the milk begins to get clear (Figs. 7 and 8), and as time passes this clear layer increases in a downward direction. It is of a slightly yellow or straw yellow colour. By the end of a week or ten days the milk culture shows on the top a layer of unaltered cream, below which the medium consists in the main of a clear or slightly turbid pale yellow watery fluid; and at the bottom of the fluid is a white mass of casein (Fig. 9). A milk culture so changed, to which I shall have to refer repeatedly as an "atypical" milk culture, has, when opened, a distinctly offensive putrid smell, and its fluid contents have distinctly alkaline reaction. When examined under the microscope it is found to contain numerous filaments and chains of rods, many of them having near one end an oval bright spore. The presence of spores in the bacilli can, however, be much earlier ascertained, as soon indeed as the first signs of atypical change manifest themselves in the milk culture. Apart from their conspicuously different aspects and reactions (see Figs. 6, 7, 8, and 9), typical and atypical milk cultures react differently on sugar gelatine; the atypical milk culture, which contains numerous spores, produces, when planted into sugar gelatine, rapidly liquefying colonies, whereas the typical milk culture, which does not contain spores, but only sporeless bacilli, produces non-liquefying small colonies.

A further curious difference between typical and atypical milk cultures of bacillus enteritidis is in their action on guinea-pigs. So small a quantity as 1 cubic centimetre of a typical milk culture per 200-300 grammes of body weight causes, as I have said, the typical and rapidly fatal disease, whereas an atypical milk culture, if used in the same dose does not cause any marked illness, sometimes only a very slight local swelling; even a double or triple dose barely causes a slight but transitory swelling. A milk culture which shows after inoculation

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with spores or with non-sporing bacilli the atypical change above described—namely, undisturbed condition of the cream layer; no conspicuous gas formation; slow and gradual separation of the milk into a clear, slightly yellow, watery fluid with, at the bottom, whitish small amount of curd; a distinctly alkaline reaction and offensive smell of the yellowish fluid; and which contains numerous threads and sporing bacilli (Fig. 18) and free spores—may be taken to have practically lost its pathogenic action. This ability to cause atypical change in milk occurs, as already stated, sometimes sooner, sometimes later, to bacillus enteritidis from any given source. Sometimes it occurs in the course of repeated transference of the spores from culture to culture; sometimes it arises in old serum cultures, or even in sealed and incubated capillary pipettes of subcutaneous exudation of a guinea-pig dead of the typical acutely fatal disease. It was milk cultures atypical in the above sense which Dr. Andrewes, having obtained them in 1896 from spores dating back to the epidemic at St. Bartholomew's Hospital in 1895, accepted as milk cultures necessarily typical of the true bacillus enteritidis; so that when he compared them with what I consider typical milk culture of this microbe, he was led to assume that the bacilli just obtained by him in 1896, and yielding similar typical milk culture, must needs be "varieties." As a matter of fact his milk cultures of his bacillus of 1896 were behaving in no way different from that in which milk cultures of bacillus enteritidis of 1895 had behaved when it was first obtained. The latter organism, however, in 1896, after about half a year's transference of the spores from gelatine culture to gelatine culture, had become changed in the above described manner, viz.: caused the atypical change in milk and had completely lost all virulence. In further proof of this I may mention that some of the samples of the bacillus enteritidis isolated in 1896 by Dr. Andrewes, from acute diarrhœa cases, and at first producing typical and virulent milk cultures, underwent, by cultivation, and in course of time, the very same change, *i.e.*, producing ultimately atypical non-virulent milk cultures.

I have hitherto described the two extremes, viz.: (*a*) spores causing typical change of milk, the whey of such recent milk culture containing non-sporing bacilli and acting virulently; and (*b*), spores of the same microbe causing the atypical change of milk, the fluid of such culture containing sporing bacilli and not acting pathogenically at all. But I have many times met with intermediate stages. Of these one is of particular interest, since it may give rise to mistakes, though it also proves the correctness of the above proposition. The sort of enteritidis culture to which I refer is that in which the milk when inoculated with the spores shows the rapid and more or less fairly typical change, viz.: in 24-36 hours, much gas, the cream layer not preserved, the milk separated into clear or slightly turbid colourless whey, with distinctly acid reaction, and having the odour of butyric acid. Such change is rapid and fairly typical; nevertheless such culture when inoculated in an ordinary fatal dose (*i.e.*, 1 cubic centimetre per 200-300 grammes guinea-pig) may not produce a fatal issue. At most there is found next day a soft tumour, and the animal may be slightly off its feed and quiet; but after another day the animal has become again lively and feeds well, the swelling has decreased and is firmer, and after a few days has altogether disappeared.

Another intermediate stage which is of importance is one in which, after the inoculation with spores, the milk culture shows the typical change less well pronounced than ordinarily; that is to say, the separation of the culture into casein flocculi and colourless whey is retarded, though the whey still gives acid reaction but feebly; also gas though formed is markedly insignificant in amount. Such a milk culture, in order to produce even a transitory illness and tumour, has to be used in double and treble dose.

Now, in all cases in which a change (decrease) of virulence is exhibited by a milk culture, even though the diminished virulence be found in the early stages of culture when the aspect of the milk is still fairly typical, there is this remarkable, and for diagnostic purposes, valuable fact: namely, that some of the bacilli (even in a fairly typical milk-culture) are found in one or other stage of forming spores. When therefore sporing bacilli are found in a young, 1-2 days old, milk culture, even if that culture be of fairly typical aspect, it may be taken for granted that the virulence of the culture is distinctly, perhaps conspicuously, less than normal. But as long as the milk culture shows no large departure from the typical behaviour, so long is it possible to bring back again the virulence of its spores. This is to be done by using large doses of the whey for injection (intraperitoneal by preference) of small guinea-pigs, and making use, as soon as the animal shows illness, of its exudation in large doses for injection of another animal. After being thus passed twice or thrice through guinea-pigs, I have in several instances found the attenuated bacillus enteritidis recovering its former virulence. When, however, a milk culture after infection with the spores of the bacillus has shown in a marked degree the atypical change, viz.: slow separation of malodorous alkaline clear fluid underneath the undisturbed cream, and formation of numerous spores, it has not been possible to again restore pathogenicity to the microbe.

Comparison of the bacillus enteritidis sporogenes with other anaërobes.

A.—*With the bacillus of malignant œdema.*

The classical accounts given by Koch (Mittheilungen aus d. k. Gesundheitsamte, Vol. I., p. 53) and by Gaffky (ibidem I., 83), of the morphology and biology of the anaërobic bacillus of malignant œdema, and which have been confirmed—as indeed they are easily confirmed—by all subsequent workers (Sanfelice; Zeitschrift f. Hygiene, XIV., p. 339), show that the spores of the bacillus and the living microbe itself—present not infrequently in manured garden earth, and in various decomposing materials—produce, on subcutaneous injection into the guinea-pig and rabbit, an acute fatal disease characterised by gelatinous hæmorrhagic swelling extending from the seat of inoculation. After death, which usually takes place in 24-48 hours after the injection, a quantity of thin, more or less sanguineous, fluid may be obtained from the gelatinous swelling, and in this fluid numerous slim motile longish bacilli are present, in the form of characteristic chains and unseptate threads. Immediately after death of the experimental animal there are only very few bacilli present in the heart's blood or in the spleen; but some hours after death they are abundantly present—generally as characteristic threads—in the spleen, in and throughout the congested abdominal muscles, in the peritoneum, and on the surface of the liver. Provided the injection of the animal has been made with a pure culture, or with subcutaneous fluid containing this species of bacillus alone, there is no gangrene of the tissues, and the exudation has no smell.

If, after death, the animal be left unopened for some hours (24 or more), the bacilli in the subcutaneous tissue form oval central spores, much thicker than the bacilli themselves. This bacillus is an obligatory anaërobe; it liquefies grape sugar gelatine, and produces in it and in sugar-agar copious gas, by which the medium becomes greatly disarranged and torn.

Now the bacillus enteritidis sporogenes which has been described in the foregoing pages, has a good many points in common with the bacillus of malignant œdema; so that by not paying attention to certain other points in which the microbes differ, the former may easily be, and I believe has often been, confounded with the latter. I propose now to point out in detail their points of resemblance, and their points of difference.

I. *Points of resemblance.*—(*a*) Both microbes are motile cylindrical bacilli; obligatory anaërobes which in grape sugar gelatine and in grape sugar agar produce gas, and which liquefy the gelatine. The bacillary rods are more or less rounded at the ends and are stained readily by the ordinary aniline dyes.

(*b*) Both injected subcutaneously in sufficient dose into the guinea-pig or into the rabbit, cause a rapidly spreading swelling and early death, the exudation containing the bacilli numerously.

(*c*) Both act more virulently if subcutaneous exudation of an infected rodent containing the microbe be used for injection instead of a pure artificial culture.

(*d*) Both form endospores, oval in shape, and thicker than the bacilli, which spores stain by the usual method of hot fuchsin.

(*e*) Both liquefy solidified blood serum and produce a uniform turbidity in sugar broth with gradual precipitation of a white powdery sediment.

(*f*) Guinea-pigs dead after injection with either, show, immediately after death, only few bacilli in the blood and viscera; some hours after death the bacilli are met with more numerously in these localities; and, while immediately after death the bacilli at and about the seat of inoculation (*i.e.*, in the exudation) contain as a rule no spores, some time (1-2 days) after death, if the body of the animal be left unopened, many of them contain spores.

(*g*) The spores of both microbes occur in decomposing animal matters, *e.g.*, manured earth, bowel evacuations of animals.

These points of resemblance are sufficiently numerous to foster mistake in identification, and I am persuaded that in many instances the bacillus enteritidis has been unknowingly confounded with the bacillus of malignant œdema. As a matter of fact I have seen cultures of what purported to be the bacillus of malignant œdema, which had been carried on for several generations in subculture, and which in reality were those of the bacillus enteritidis.

II. *Points of difference.*—(*a*) The bacillus enteritidis sporogenes is distinctly a thicker bacillus than the bacillus of malignant œdema; in point of thickness it approaches bacillus anthracis, whereas the bacillus of malignant œdema of Koch and Gaffky is conspicuously thinner than that of anthrax. The spore-bearing bacillus enteritidis in the intestinal contents of a case of cholera nostras or of epidemic diarrhœa is much thicker than ordinary; but stress may not be laid on this, since increased thickness of rods when spores are being formed in them is a general feature of all sporing bacilli. The typical bacillus enteritidis is a short cylindrical rod, the majorty of the bacilli being 2-4 times as long as thick. This is particularly evident when these bacilli and bacilli of malignant œdema, both from the subcutaneous exudation of an experimental animal, are compared. In the exudation of a guinea-pig dead after injection with the bacillus enteritidis, the bacilli are rods in a vastly preponderating majority, with only here and there a chain of two, three, or four bacilli; whereas in the exudation caused by the microbe of malignant œdema the bacilli form typical longer or shorter unseptate threads (Koch, Gaffky, Frænkel). Amongst the very large number of experiments that I have made with bacillus enteritidis, I have not met with a single instance of such unseptate threads in the exudation. The only instances in which I have seen long threads formed by this microbe were in sugar gelatine and milk cultures after the bacilli had undergone marked attenuation in virulence and marked alteration of their biological characters (as described on a former page of this report), and in the subcutaneous exudation of guinea-pigs killed 24 hours after inoculation with attenuated culture, which exudation was incubated as a whole—see Fig. 24. The bacillus of malignant œdema is as a rule met with in the form of typical longer or shorter threads in the spleen and in the abdominal viscera, provided the animal is left unopened for some hours after death. This is not, however, the case with the bacillus enteritidis. I have in many instances examined the spleen after the body of the experimental animal had remained unopened for 24 hours and more after death, and although in these instances the spleen tissue contained an abundance of rods, threads were conspicuous by their absence. Further, it has been shown by Gaffky and Sanfelice that in the kidney and liver and abdominal muscle, &c., of the infected and dead animals the bacillus of malignant œdema is abundantly present as threads, if the examination is made some hours (1-2 days) after death. Sanfelice (l.c.) gives, in Plate V., in figs. 51, 52, 53, 54 and 55, illustrations as to these points in the abdominal muscle, kidney, and liver of guinea-pigs, 48 hours after death. Such a condition is never found in these tissues of guinea-pigs dead after injection with bacillus enteritidis; in the kidney the bacilli rods are very few and far between, in the abdominal muscle they are limited almost entirely to the outer surface, *i.e.*, the part facing the gangrenous subcutaneous cavity or cavities (see Fig. 22).

(*b*) An important point of distinction between the two microbes is the staining after Gram's method. Film specimens of the bacillus of malignant œdema, whether from the subcutaneous exudation or from culture, after subjection to staining become always decolourised, whereas similar film specimens of the bacillus enteritidis retain the stain easily and well. I have made a number of experiments in this direction, and the results were always the same. Film specimens of the bacillus enteritidis are stained in alcoholic gentian violet aniline water for one minute, then, after washing in absolute alcohol, are kept for four minutes in the normal iodine iodide of potassium solution. In these circumstances enteritidis bacilli remain stained deep violet black colour, whereas the bacilli of malignant œdema treated in the same way become quite decolourised.

(*c*) A further difference between the two microbes is the number and disposition of their flagella.

The typical bacillus of malignant œdema has generally a number of fine curved flagella fixed along the sides of its cylindrical body,

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whereas the typical bacillus entertidis has, as I have pointed out and figured in my report for 1895-1896, several long flagella, sometimes quite a bundle, generally close to one or both of the rounded ends, the main body of the bacillus remaining free of them.

Although both microbes liquefy sugar gelatine rapidly, there is a marked difference between the two in stab cultures in sugar gelatine. As was pointed out in my first report (1895-1896) the bacillus enteritidis of stab cultures produces a uniform fairly clear liquefied cylindrical growth along the stab, which rapidly spreads in breadth and length; whereas the bacillus of malignant œdema causes a less rapid growth, the liquefied gelatine is more turbid, and the cylindrical liquefied mass gives off more or less longer or shorter lateral offshoots (see Sanfelice, Plate II., figs. 4, 5, 6).

(*d*) In an animal dead after injection of pure culture of the fully virulent bacillus of malignant œdema, the subcutaneous tissue is found infiltrated with an extensive more or less hæmorrhagic gelatinous mass, and from this, when cut into, a thin blood-tinged fluid flows out, which has no odour. An animal dead after injection of pure growth of the fully virulent bacillus enteritidis shows extensive gangrene of the subcutaneous and muscular tissues; in most instances the skin is discoloured and the hairs of the surface together with the superficial cuticle are easily scraped or pulled off; there is abundance of gas between the skin and the gangrenous tissue beneath; and there is beneath the skin copious malodorous more or less viscid sanguineous fluid containing as flocculi partially dissolved lumps and shreds of connective and muscular tissue. This condition of gangrene is of a uniform and constant character when the bacilli possess their cultural and physiological characters unimpaired, and when death takes place in the normal time, *i.e.*, 16-24 hours. But when the microbes commence to undergo, or have more or less distinctly undergone, attenuation, a gelatinous swelling without gangrene may (as described on a former page) be the result. In these cases death does not occur, the animal recovers.

(*e*) A further difference consists in the disposition of the spores within the bacilli in the two microbes. The spores of the bacillus of malignant œdema are situated as a rule in the middle of the bacilli, whereas those of the bacillus enteritidis are as a rule near one end. It is true that in gelatine cultures of enteritidis in which rapid liquefaction and rapid spore formation occurs, many bacilli appear to have the spores in their middle part, but in serum cultures and in the subcutaneous exudation the spores appear in the very great majority of the bacilli near one end.

If the spores of the enteritidis bacillus are planted on the surface of formate agar plates and incubated anaërobically, the colonies are, as mentioned on a former page, circular discs, more granular and thicker in the middle part, and translucent less granular and thinner in the marginal zone. The bacillus of malignant œdema on the other hand, already in its early phases, forms under the same conditions angular crenate discoid colonies.

The earliest and best cultural differences between the two microbes may be found in anaërobic milk culture. The aspect of a typical milk culture of the bacillus enteritidis, or of its spores, has been repeatedly described in this report, and it is not necessary to describe it again. On the other hand, milk inoculated with the bacillus (or its spores) of malignant œdema does not develop gas bubbles so strikingly or

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rapidly and copiously; only slowly relatively does a partial separation occur of the fluid and coagulated part which commences near the cream layer. And what is of equally striking character, the fluid of the malignant œdema milk culture does not give acid reaction. The malignant œdema bacillus in fact does not modify the initial alkaline reaction of the milk culture, and the milk culture has no butyric or other smell; whereas in the case of the typical bacillus enteritidis the separated whey is distinctly acid in reaction already after 24 hours' incubation, and has a pronounced odour of butyric acid. The milk culture in which the malignant œdema bacillus is growing shows already in its early phases (in 2-4 days) many bacilli containing spores, whereas in the typical milk culture of the bacillus of malignant œdema, the bacilli remain for many days, often permanently, without spores. The typical milk cultures of the malignant œdema bacillus resemble in aspect and character rather the atypical culture of the bacillus enteritidis described at page 14 of this report.

B.—*With the bacillus of symptomatic charbon (black quarter, quarter ill, Rauschbrand.)*

I. *Points of resemblance.*—(*a*) The bacillus enteritidis is of about the same thickness as the rauschbrand bacillus, but is (at any rate in the subcutaneous exudation of an infected animal) distinctly shorter than the latter. Both are obligatory anaërobes, liquefyers of sugar gelatine, and producers of gas bubbles in gelatine and agar; and both form spores situated near one end of the bacillus.

(*b*) The aspect and character of the anaërobic milk cultures are the same for both microbes: rapid separation of colourless clear or slightly turbid whey, copious gas formation, and acid reaction and butyric smell of the whey.

(*c*) Also in respect of the colonies on the surface of formate agar plates (anaërobically incubated) the two microbes resemble one another.

II. *Points of difference.*—(*a*) The bacillus of rauschbrand has not by any means the wide distribution of the bacillus enteritidis; in fact, though it occurs in soil, so far as is at present known it does so chiefly in connection with the disease rauschbrand in cattle, sheep and goats.

(*b*) The bacillus of rauschbrand is not virulent to the rabbit.

(*c*) The bacillus of rauschbrand causes on subcutaneous injection into the guinea-pig a sanguineous, or rather hæmorrhagic, swelling in which numerous gas bubbles are present; hence its name rauschbrand or crepitating tumour. It certainly does not produce extensive gangrene and offensive exudation like the bacillus enteritidis.

(*d*) The bacillus of rauschbrand does not stain after Gram's method, and does not liquefy solidified blood serum. In sugar gelatine stab culture it grows much slower and liquefies much slower than the bacillus enteritidis; besides, the channel (stab) of the growth in the sugar gelatine is, in the case of the rauchsbrand bacillus, possessed of many short lateral offshoots.

C.—*With the bacillus butyricus of Botkin.*

Morphologically and culturally in sugar gelatine, in agar, and particularly in milk this microbe is closely similar to the bacillus enteritidis. But as pointed out in my former report the bacillus

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butyricus of Botkin is without any pathogenic action even when injected in large doses subcutaneously into the guinea-pig or rabbit. It lacks, therefore, an easily ascertained fundamental character, and needs not to be further compared with the bacillus enteritidis.

D.—*With the bacillus of tetanus.*

The two microbes resemble one another in the circumstance that they are both sporing anaërobes to be found in horses' dung and manured earth, and that both liquefy sugar gelatine. But in its manner of liquefaction, in the peculiar relation of its terminal spores (drumsticks), in its size, and in the manner of its growth the tetanus bacillus in sugar gelatine is utterly different from bacillus enteritidis. The tetanus bacillus, for instance, in stab culture in sugar gelatine exhibits a characteristic central line from which sprout laterally numerous long thread-like offshoots, diminishing in length from the middle upwards and downwards, and giving the well-known characteristic spindle-shaped aspect of the thready tetanus growth. Further, the action of the tetanus bacillus in producing acute tetanus in the mouse and rabbit is so specific and characteristic that a mistake cannot be made between the tetanus bacillus and any other of the tribe of anaërobic sporing bacilli.

OCCURRENCE OF THE BACILLUS ENTERITIDIS IN INFANTILE DIARRHŒA.

I now proceed to the results of search in the bowel discharges and bowel contents of infants affected with or dead from autumnal diarrhœa for the spores of the anaërobic bacillus enteritidis. In this connection it is necessary that I should acknowledge my indebtedness to Drs. Barlow, Still, Crowley, and Batten of the Children's Hospital, at Great Ormond Street, for their assistance generally, and for supplying me from time to time with the materials necessary for my purpose.

Case I.—Ethel R., æt. nine months, had been wasting through diarrhœa for a month; she died July 23rd. On post-mortem examination there was the usual evidence negative as to disease of the viscera; and for the rest there were the appearances generally found in children dead from summer or autumnal diarrhœa; namely, the intestines, both large and small, pale, with here and there an injected part of the mucous membrane; the cavity of the ileum containing a thick semi-fluid "custard-like" material.

Fresh and stained specimens of the custard-like contents of the ileum, examined under the microscope, revealed crowds of bacteria; amongst them some cylindrical rods which by their aspect, thickness, and size might well be the bacillus enteritidis, particularly as some of the rods included a terminal oval spore. Cultivations of the custard-like contents of the ileum, were made in milk and sugar gelatine by inoculating these media with a loopful of the material, heating the mixture to 80° C. for 10-15 minutes, and then incubating the tubes anaërobically. The result was that alike from the sugar gelatine and from the milk culture, virulent bacillus enteritidis sporogenes was obtained; so that the ileum must have contained the spores of this microbe. It has to be added that the virulence of the microbe from this case did not persist in subculture for more than a few removes. Thus I find in my notebook the following: "With the fluid of a liquefied colony in sugar gelatine (made from the original ileum contents of above case), injected one guinea-pig, subcutaneously. This animal showed after 20 hours much gelatinous tumour on abdomen; was very quiet, and did not feed; killed it. On post-mortem examination there was found the typical gangrene in subcutaneous and muscular tissue with malodorous sanguineous exudation; this latter containing numerous bacilli. A milk culture made from this exudation showed, after 24 hours, typical change, with much gas. The whey gave acid reaction and contained numerous bacilli, some of them each with a small spore. One cubic centimetre of this whey proved of very little virulence in a guinea-pig, causing merely local swelling, which in a few days had quite disappeared.

Case II.—M. R., æt. six months, had been ill with diarrhœa for eleven days; during the last two days (since July 24th) had very bad diarrhœa. From the diaper, on July 26th, some greenish flakes were scraped off, which were examined microscopically, and used for the inoculation of sugar gelatine and milk cultures. These cultures were heated to 80° C., and afterwards incubated anaërobically. They remained barren of any growth; and the flakes, therefore, scraped off from the diaper of this infant, did not contain spores of the bacillus enteritidis. Microscopic examination of dried and stained film specimens of the flakes showed, however, cylindrical bacilli, singly and in chains which might well have been the non-sporing bacillus enteritidis. In aspect, size, and thickness they coincided well with this latter, but, of course, no proof of this could be established; what was established was that no spores of the bacillus were demonstrable in the flakes. This infant was not seen a second time, and therefore no further examination could be made.

Case III.—P. W., æt six months, died July 25th. This infant had been ill with acute diarrhœa for 18 hours only. On post-mortem examination there was the usual negative evidence as regards the viscera; the intestines were pale, the contents of the ileum like custard. Cultures of the contents of the ileum were made in sugar gelatine and in milk anaërobically. The result was positive, viz.: the intestinal contents contained the spores of the virulent anaërobic bacillus enteritidis.

Case IV.—F. W., æt five months, died of diarrhœa, after very short illness on July 31st. The post-mortem appearances were: pale intestine; mesenteric glands enlarged. Cultivation experiments of the intestinal contents proved negative as to spores of bacillus enteritidis.

Case V.—R. L., æt five months, died after acute gastro-enteritis, two days. Post-mortem on August 4th; appearances those usual in summer diarrhœa. Cultivations of intestinal contents negative as to spores of bacillus enteritidis.

Case VI.—B. L., æt five months; acute gastro-enteritis for 3 days. Post-mortem appearances of the usual character. Cultivations negative as to spores of bacillus enteritidis.

Case VII.—A. S., æt nine months; dead after 4 days' illness from acute diarrhœa. Post-mortem appearances as before. Cultivation negative as to spores of bacillus enteritidis.

Case VIII.—E. P., æt eight months; dead after 3 days' illness with diarrhœa. Post-mortem appearances as in the other cases. No evidence as to spores of bacillus enteritidis.

Though in these five cases (IV.-VIII.) no spores of bacillus enteritidis could be demonstrated, there were present in the bowel contents numerous rods and cylinders which, in size, aspect, and after staining, could not be distinguished from the bacillus in question.

Case IX.—J. F., æt five months; died September 14th from acute gastro-enteritis, the diarrhœa having been severe and lasting only a few days. In this case microscopic examination of the grumous contents of the intestines (ileum and cœcum) revealed an enormous number of cylindrical bacilli, singly and in chains, which from their aspect and size, and by their containing oval spores, could not be distinguished from bacillus enteritidis. As culture experiments subsequently proved, the microbe present was bacillus enteritidis sporogenes in a particularly virulent form.

Case X.—J. C., æt seven months, died September 18th. Had suffered from diarrhœa on and off for two months. Post-mortem the appearances were those usual in death by summer diarrhœa. In the grumous contents of the ileum of this case also, the spores of virulent bacillus enteritidis were easily demonstrated by the anaërobic milk-culture, and further by animal experiment. The microscopic examination of the stained film specimens of the intestinal contents in this case also showed numerous bacilli as cylindrical forms and as chains, some including spores which could not be distinguished from bacillus enteritidis.

Case XI.—A. A., æt four months; suffered for 14 days from diarrhœa. Post-mortem on September 18th revealed the usual appearances. Cultivations of the contents of the bowel proved negative as to spores of the bacillus enteritidis. In microscopic specimens of the intestinal contents bacilli could be seen which in aspect and size resembled bacillus enteritidis.

From these observations it follows that in the intestinal (ileum) contents of four of these ten cases of fatal infantile diarrhœa the spores of the bacillus enteritidis were detected by culture. These four cases are:—Nos. I., III., IX. and X. But in every one of the other six fatal cases, and in one non-fatal case, bacilli, as chains and as cylindrical rods, could be demonstrated in microscopic specimens of the bowel contents that might have been bacillus enteritidis in a non-sporing state. As the method of anaërobic milk culture, after heating to 80° C. for 10-12 minutes, is the only one which I found applicable for discovery of the spores of the anaërobic bacillus enteritidis, it follows that unless this microbe was present in a spore state the method adopted could not demonstrate it; all non-sporing bacilli being killed at and below 80° in 10 minutes' exposure. Anaërobic cultures (milk or sugar gelatine), which are not heated are of no avail, because bacillus coli grows facultatively anaërobically both in sugar gelatine and in milk, and in its presence the obligatory anaërobic bacillus enteritidis has only a very poor chance.

With our present methods, therefore, we cannot say whether the anaërobic virulent bacillus enteritidis was present in all the cases examined. Its spores were certainly present in 4 of the 11 cases, as proved by culture; microscopically the microbe seemed to have been present in all. One feature which certainly does not militate against the assumption that bacillus enteritidis may have been present in all—at any rate in the ten cases in which post-mortem examination was made—is that there was present in the intestine a large amount of gas, such as would be easily accounted for and could easily be produced by this microbe. Why the microbe should have formed spores in the intestine in some cases and not in others, I am unable to say; but I can recall the fact, that I have seen not unfrequently that the same is true of the subcutaneous exudation of guinea-pigs dead after injection of milk culture or of subcutaneous exudation containing this microbe, viz.: while in some samples of subcutaneous exudation from such guinea-pigs the microbe readily forms spores, in others no spores are formed either in the animal body (kept for two days after death) or in capillary pipettes filled with the exudation sealed and incubated for many days.

Spore formation is, as regards bacillus enteritidis, beset with many difficulties, which I do not pretend to understand or to explain. Thus, I do not understand and cannot explain, why the bacilli do not form spores in a virulent typical milk culture; nor why when a milk culture changes, or has a tendency to change, atypically, and to become non-virulent, the bacilli readily form spores; nor why if the colonies that appear in gelatine are producing much free gas, no spore formation or very retarded spore formation occurs, whereas rapid liquefaction and little free gas is associated with copious formation of spores; nor why no spore formation occurs either in agar stab or agar plate culture, while it is easily obtained on solidified blood serum. All these are points which require elucidation, but they must for the present remain unexplained, just as the formation of spores by the microbe in the intestine of some of the above cases and not in others also remains unexplained.

OCCURRENCE of BACILLUS ENTERITIDIS in CHOLERA NOSTRAS.

Besides the cases of summer diarrhœa above enumerated, several cases of acute gastro-enteritis in adults were made the subject of inquiry as to the presence in their bowel discharges of the spores of bacillus enteritidis. Some of these cases terminated fatally under symptoms and appearances of cholera; some indeed of them were so acute and striking in their clinical history that they were declared by their medical attendants to be cases of Asiatic cholera.

Case XII.—Ada S., æt 17, died under symptoms of cholera, "the case presented all the symptoms of cholera during life, and after death the characteristic features of cholera were observed at the post-mortem examination." This girl died on August 14th, 1897, at Bethnal Green. Her stomach and intestine were sent me by the Medical Officer of the London County Council, with the above statement that the symptoms had not been distinguishable from those of cholera, and that the disease lasted only about 11 hours. The stomach was found much congested, as was the ileum also.

Microscopic and cultural examination of the bowel contents proved negative as regards the cholera vibrio; but by anaërobic milk culture of the same material, after heating to 80° C., the spores of the bacillus enteritidis were easily discoverable. The milk on incubation changed in the typical manner, and the whey of the milk culture proved very virulent. In this case indeed the presence of bacillus enteritidis was readily detected on the microscopic examination of the fresh material. For the mucous membrane of the ileum was much congested, and the lymph follicles of the mucous membrane were found swollen; and these follicles examined in microscopic specimens were seen to contain the bacillus enteritidis—or a bacillus morphologically like it—in almost pure state.

Case XIII.—Helen P., æt 64, of Grimsby, died on August 20th, under symptoms of collapse, having suffered for two days severe purging and sickness, and severe continuous cramps in legs and arms. On post-mortem examination the bowels were found nearly empty; no special congestion. Microscopic and cultural examination of the bowel contents gave negative results as regards the cholera vibrio; but the anaërobic milk culture of the material yielded distinct evidence of bacillus enteritidis sporogenes.

Case XIV.—J. G., æt. 35, of Shoreditch. A bowel evacuation of this case was sent to me on August 23rd by the Medical Officer of the London County Council. The patient had been ill with acute diarrhœa, but recovered. Microscopic and cultural examination of the stool failed to show the presence either of the cholera vibrio or of the bacillus enteritidis.

Case XV.—J.F., æt. 30, of Camberwell. On August 23rd, a piece of small intestine was sent me by the Medical Officer of the London County Council. No definite history except diarrhœa. The intestine contained greenish-yellow fæces. Anaërobic milk culture of the bowel contents failed to show the presence of the bacillus enteritidis. No cholera vibrios were demonstrable either under the microscope or by culture.

Case XVI.—This was a fatal acute case of cholera nostras, observed by Dr. Andrewes, and described by him as Case XX. in his report for 1896-1897. The cultivation of the microbe isolated by Dr. Andrewes from the bowel contents of this case and placed by him at my disposal, was in no way different morphologically, culturally, and physiologically from the typcal bacillus enteritidis sporogenes.

Cases XVII. and XVIII.—Two elderly ladies (E. and S. P.), sisters, were taken ill with severe diarrhœa; they had been out to supper, and some hours later, after their return home, and after having gone to bed, were both seized with severe purging and vomiting. The stools were copious, and contained a good deal of blood. Under medical treatment both patients recovered after an illness lasting 48 hours. From the stools of both patients Dr. Andrewes easily recovered the bacillus enteritidis sporogenes, cultures of which proved on further examination to be typically virulent.

Case XIX.—On December 4th, a rice-water stool was sent me through the Local Government Board. It was from Dr. Benjamin Jones, of Swansea, and was that of a patient who, on December 3rd, "was suffering from typical symptoms of cholera." The stool was quite watery, like rice-water, and contained a large number of gelatinous flakes. Under the microscope these flakes contained neither epithelial cells nor leucocytes, but were chiefly made up of amorphous mucus. Microscopic and cultural experiments did not reveal the presence of cholera vibrios in the stool; but by anaërobic milk-culture of the material virulent bacillus enteritidis sporogenes was easily isolated. The virulence, however, of this sample of the microbe was not quite so high as that, for instance, of Case XVI.

From these observations it is seen that the bacillus enteritidis was found in cases XII., XIII., XVI., XVII., XVIII. and XIX.; that is in all but two of the eight "choleraic" cases examined. Of these two cases, however, in regard of one, XIV., there was no definite history of the diarrhœa, and as regards the other, XV., the piece of intestine submitted contained fæces which did not differ from normal fæces. Consequently in all the cases in which there was distinct history of

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cholera nostras, XII., XIII., XVI., and XIX.), or of acute severe diarrhœa (XVII. and XVIII.) the presence of the spores of the virulent bacillus enteritidis was easily demonstrated.

While this report was being written there occurred amongst the patients of St. Bartholomew's Hospital another outbreak of severe diarrhœa, similar to, but more extensive than, that of October, 1895, and which is described in my report 1895-1896.

The history of the present outbreak, as supplied to me by Dr. Andrewes, is as follows:—

In the night of Sunday, March 6th, 1898 (from about 8 o'clock at night, onwards, till about 4 o'clock in the morning of March 7th), there occurred some 144 cases of severe diarrhœa, distributed amongst patients in both surgical and medical wards of the hospital. Dr. Andrewes, who investigated the cases, states that most of them had repeated copious fluid bowel discharges with griping pains; some of the discharges contained a great deal of mucus and blood. All recovered. Several of the stools were examined, and all contained (see Fig. 25, 26, and 27) rods and spores of bacillus enteritidis in very great abundance. In the mucus flakes of some stools, bacilli, non-sporing and sporing, were present in astonishing numbers; also free fully-formed spores were abundant. Cultures of the bowel contents made in sugar gelatine and in milk (heated to 80° C. from 10-15 minutes, and incubated anaërobically) gave positive evidence as to the presence of bacillus enteritidis (see Figs. 28 and 29), and certain of these milk cultures proved virulent and characteristic of the microbe. This was particularly the case with milk cultures of stools of the severer cases; cultures of other stools were now and again of distinctly decreased virulence. Dr. Andrewes was able to prove that the milk which had been delivered at the hospital on Sunday morning, March 6th, about 7 o'clock, was the vehicle of the infection. This milk had been consumed by the patients between 8 and 11 o'clock a.m., on the same day. All nurses, except one, escaped. This nurse had the same milk as the patients; all the others had a different milk supply. A sample of the milk of this Sunday morning's delivery at the hospital was tested by culture, and gave positive evidence of the presence of the spores of bacillus enteritidis of a virulent character.

OCCURRENCE of the SPORES of BACILLUS ENTERITIDIS in MILK.

The important relation presumably existing between food stuffs—milk in particular—and summer diarrhœa, has received much attention on the part of epidemiologists; milk-fed infants forming, as a matter of fact, the bulk of the sufferers by that disease. For the same reason it appeared desirable to ascertain whether, and to what extent, milk, such as is bought in retail shops in London, is apt to contain the spores of the bacillus enteritidis. As it seemed to me, if only a few spores of bacillus enteritidis got access to such milk, it might, milk representing one of the most favourable media for the development and rapid multiplication of the microbe at those seasons when temperature is most favourable to rapid development of bacterial life, become endowed with a poisonous character, and thereby probably become capable of causing diarrhœa in ill-fed, and therefore susceptible, infants.

In various quarters of London, I bought, between end of April and end of June, samples of milk at shops of various characters. The milk was in each instance placed at the shop in a sterile bottle, closed with a glass stopper, and then taken to the laboratory, where it was at once subjected to the necessary culture tests. It should be noted that while some of the milk samples were obtained in back streets and from dingy shops, and others from clean well-kept dairy-shops, there was no evidence forthcoming as to superior quality of the milk from sources of the latter sort in respect of the presence of the spores of bacillus enteritidis. I am, therefore, inclined to assume that the pollution of the milk with bacillus enteritidis must, when it was found, have occurred antecedent to the arrival of the milk at the shop.

The method of testing the samples of milk for the presence of spores of the bacillus enteritidis was this:—On arrival at the laboratory of the sample in a sterile bottle, 20 cubic centimetres were poured into a sterile test tube plugged with sterile cotton wool, and the contents of the tube heated to 80° C. for 15 minutes, so as to kill all non-sporing microbes. It was then cooled, placed in a Buchner tube, and incubated anaërobically at 37° C. If the milk contained the spores of bacillus enteritidis, this was shown clearly by the characteristic and typical change in these cultures, and by the virulent action on the guinea-pig of the whey of such milk culture.

The typical change was generally, in fact in all positive cases, noticed already after 24 hours' incubation, and as already mentioned, consisted in the following appearances:—Copious gas formation by which the cream layer is deranged or entirely destroyed, the milk becoming changed into colourless clear, or slightly turbid, whey, on the top of which accumulated faintly pinkish flocculi of casein; at the side and bottom of the tube also there were a few casein masses. The whey, which was a thin fluid and had acid reaction and butyric smell, contained cylindrical rods very numerously. One cubic centimetre of this whey injected subcutaneously into the groin of a guinea-pig (200-300 grammes in weight) caused typical extensive gangrene of the subcutaneous and muscular tissues with sanguineous exudation, and death of the animal, usually in 16 to 24 hours. Now and again, as described on a previous page, death was delayed until lapse of 28 or even 30 hours, and in particular cases, though the inoculation produced extensive tumour with subsequent sloughing of the skin, the animal ultimately recovered.

Ten different samples of milk submitted to the above milk-culture test yielded in eight instances (80 p.c.) positive result; twice only was the allied non-pathogenic anaërobic bacillus butyricus of Botkin obtained from the milk. Of the eight positive cases, the milk, after heating to 80° C. for 15 minutes, yielded four times, when anaërobically incubated, *pure* culture of the anaërobic virulent bacillus enteritidis sporogenes. In the other four samples giving positive result, the spores of bacillus enteritidis were associated with the spores of other (aërobic) microbes (bacillus mesentericus vulgatus or bacillus mesentericus ruber). But the presence of these did not interfere either with the rapid growth of bacillus enteritidis and the consequent rapid and typical change of the milk, or with the virulence of the so-changed milk culture; and further, when the subcutaneous exudation of the guinea-pig which had been injected with a "mixed" milk culture of the above sort, was subjected, immediately before or after death of the animal, to culture test in agar plate or sugar gelatine, such exudation was found to have contained bacillus enteritidis practically in pure culture. If, however, the animal happened to have been dead several hours before the subcutaneous exudation could be submitted to culture, the resulting subculture was found impure; in such cases, in order to obtain the bacillus enteritidis separate from other microbes, it was necessary to inject the subcutaneous exudation into a further guinea-pig, and to obtain from this animal its subcutaneous exudation, either immediately before or just after death.

The above result of the examination of ordinary milk bought in retail shops was sufficiently striking; but it was also found that so-called "pure sterilised milk" could yield evidence of the presence of the spores of bacillus enteritidis. Three different samples of "pure sterilised milk" were submitted to bacterioscopic test on the above plan, viz.: immediately on opening the bottle, 20 centimetres of the contained milk were poured into a sterile test tube, heated to 80° C. for 15 minutes, and then incubated anaërobically at 37° C. One of these samples of "sterilised" milk thus dealt with yielded a pure culture of the virulent bacillus enteritidis sporogenes; a second sample yielded the bacillus mesentericus vulgatus in pure culture; and a third sample yielded the bacillus mesentericus ruber in pure culture.

The spores then of these three microbes had withstood the trade process of "sterilization." Seeing that the spores of the two last-named microbes withstand direct boiling of the milk for 8, 10, or even 12 minutes (the spores of the bacillus enteritidis in milk do not, as a rule, survive direct boiling for more than three to five minutes), I conclude that in the process of "sterilization" of the above samples the milk had not been subjected to direct boiling for a sufficient period.

A consideration that suggests itself in connection with the above testings of retail milk is the following:—Since the spores of bacillus enteritidis occur so frequently in ordinary retail milk, how is it that such milk does not more often cause, in a wholesale manner, diarrhœa in the persons consuming it?

As to this, it has in the first place to be borne in mind that cultures of the bacillus enteritidis resulting from spores from different sources are not all of the same degree of virulence, as is proved by a comparison of the results after injection of their milk cultures into guinea-pigs; all are, it is true, pathogenic, but though in some cases highly virulent, in others they are less so, and may even produce only transitory illness followed by recovery. Much may depend, therefore, on the "strain" of bacillus enteritidis which obtains entrance into the milk. Secondly, there is the question as to what determines excessive proliferation of the bacillus in the milk after gaining access thereto. Apart from season, the temperature of summer and early autumn being no doubt favourable to rapid multiplication of the microbe in the milk, there must, in particular milks, be some condition, chemical or other, which makes them specially favourable, not only to the rapid multiplication of the bacillus, but favourable also to production by it of virulent progeny. Some such condition of milk is suggested by the two extensive epidemic outbreaks of diarrhœa that occurred amongst the patients at St. Bartholomew's Hospital (October, 1895, and March 6th, 1898), which were traced to milk. Both outbreaks were due to milk delivered on a Sunday, and it is not improbable that on this day the previous treatment of the milk supply by the dealers was different to that customary on other days.

OCCURRENCE of BACILLUS ENTERITIDIS in SEWAGE.

Examination of samples of sewage obtained by me from various localities has always yielded the bacillus enteritidis, and I conclude, therefore, that the spores of this microbe form a normal constituent of sewage. Thus:

Samples of sewage, inclusive of raw sewage and sewage effluent, as follows, were examined and readily yielded in every instance evidence of the spores of bacillus enteritidis sporogenes:—

(1) Sewage of St. Bartholomew's Hospital; this has been examined on four different occasions.

(2) Sewage of Hendon; this has been examined on three different occasions.

(3) Sewage from Crossness outfall; on several different occasions.

(4) Sewage from Barnsley; once.

(5) Sewage from Exeter; on three separate occasions.

In every instance a small quantity (1/100-1/10 of a cubic centimetre) of the sewage was added to about 15 cubic centimetres of sterile milk in a test tube, and, the mixture having been heated to 80° C. for 10-15 minutes, was put in a Buchner tube, and incubated at 37° C. Next day the milk was found changed typically, and the whey of the culture on injection into the groin of a guinea-pig produced the characteristically acute fatal disease, viz.: typical extensive gangrene of the subcutaneous ad muscular tissue, with more or less copious malodorous sanguineous exudation, the latter crowded with the bacilli.

The results thus obtained in the above experiments, both as to aspect and nature of the anaërobic milk cultures and as to the action of the whey from such cultures on guinea-pigs, were so speedily secured, and were so uniform and striking in character, that it may be confidently affirmed that this milk test is easily applicable whenever it is desired to speedily demonstrate in any solid or fluid the presence of bacillus enteritidis sporogenes, or, by implication, a suspected pollution of a given solid or fluid with sewage. Thus, Thames mud and water taken from the shore at Blackfriars Bridge, at Richmond, and below Staines, yielded at once evidence of the presence of the spores of bacillus enteritidis; that is to say, in localities at which notoriously the Thames contains a good deal of sewage as is shown at low tide by the black mud of the shore. Similarly, further down the Thames, towards the river mouth, mud deposits on the shore always and readily yielded this microbe when subjected to the above milk test.

A number of observations were made with regard to ascertaining approximately the number of spores present in a given sample of sewage or of effluent. This could easily be achieved by adding to a series of milk tubes small quantities of different dilutions of the sewage, so as to ascertain the smallest quantity of sewage required to produce the typical change in the milk. It was found, as was to be expected, that sewage from the same locality varied at different times considerably in this respect. For instance, in Hendon raw sewage the number of spores of bacillus enteritidis amounted one week to as many as 2,000 or even 5,000 per cubic centimetre of the raw sewage, whereas another week their number had fallen to 200 per cubic centimetre. As an average I should say that most sewage contains about 500-600 spores of the microbe per cubic centimetre.

OCCURRENCE of BACILLUS ENTERITIDIS in MANURE.

By means of anaërobic milk culture the spores of the virulent bacillus enteritidis are demonstrated in horses' dung and in all matters polluted with it; *e.g.*, sweepings of London streets, garden earth, earth from manured meadows and fields, &c. A small particle, not more than a gramme or two of such earth, manure, or horses' dung, is shaken up with sterile water or salt solution, and a small quantity of the emulsion thus made is added to sterile milk. This having been heated to 80° C. for 10-15 minutes, is cooled and then incubated anaërobically at 37° C. Next day the milk is found typically changed, and the whey contains bacillus enteritidis abundantly; and one cubic centimetre injected into the groin of a guinea-pig causes the typical disease and death in 20-24 hours with the characteristic malodorous sanguineous exudation and extensive gangrene.

It is a noteworthy fact that cows' dung and pigs' dung did not, examined by the above methods, yield evidence of the spores of this bacillus. In this respect, as also in regard to the anaërobic bacillus of tetanus, horses' dung behaves differently to the dung of certain other animals.

From the researches of Koch, Gaffky, Frænkel, and Sanfelice, it is well known that manured earth introduced into the subcutaneous tissue of the guinea-pig causes death of that animal in a day or two from malignant œdema; likewise it is known that the subcutaneous exudation of such an animal is malodorous, and that there is present gangrene at the site of inoculation. Now, Koch, Gaffky, and Sanfelice have proved that the bacillus of malignant œdema taken from a pure culture does not cause malodorous œdema, and does not cause gangrene; and the conclusion has been drawn by these observers that when such a condition occurs after injection of garden earth, it must be due to presence in the earth of some microbe (probably anaërobic) other than the bacillus of malignant œdema. I am now in a position to affirm that this gangrene is due to the presence and growth in the tissues of bacillus enteritidis. For in the first place every sample of manured earth that I have tested by the anaërobic milk culture yielded positive evidence of the presence of this bacillus. Secondly, not by any means every sample of garden earth yields the bacillus of malignant œdema (see also Sanfelice l.c.). Thirdly, as I have had occasion to observe on a former page, injection of pure culture of bacillus enteritidis into the guinea-pig causes the malodorous exudation and extensive gangrene.

Upon a review of all the facts so far to hand, it follows then that the spores of the bacillus enteritidis have a wide distribution in nature, and that there is ample opportunity for the spores to obtain access to milk and other articles of food. Amongst the sources of this bacillus are the evacuations of cases of diarrhœa, sewage, water, soil, and dust polluted with sewage; as also horses' dung. The microbe being an anaërobe and forming readily highly resistant spores, will obtain ready means of multiplication and preservation wherever it is capable of finding conditions of anaërobiosis, and having formed spores will be capable of preserving its existence more surely than many of the aërobic non-sporing microbes of putrefaction. Fortunately, the easy and relatively simple method of its detection by anaërobic culture of any suspected material in milk and subsequent injection of the whey of such culture into the animal body constitutes a great advantage; the microbe can be at once singled out from its competitors, the aërobic non-sporing microbes of putrid decomposition.

BACILLUS ENTERITIDIS SPOROGENES.

PLATE I.

FIG. 1.

Culture in *sugar gelatine* of spores of bacillus enteritidis, after incubation for 48 hours at 20° C., showing liquefying colonies.

[Magnifying power, 3½.]

PLATE I.

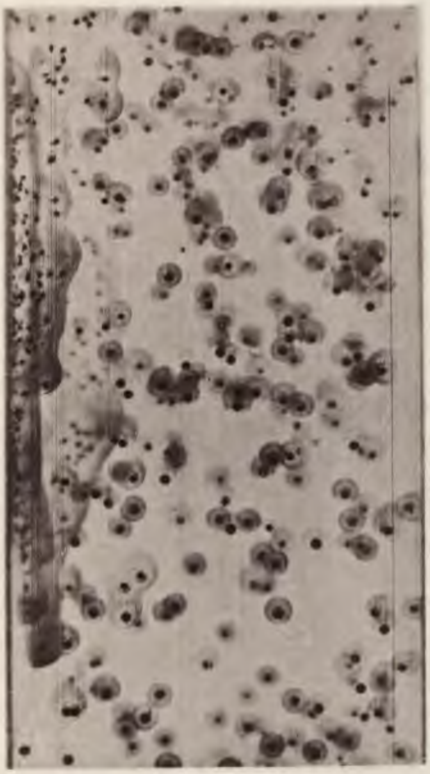

Fig. 1.

PLATE II.

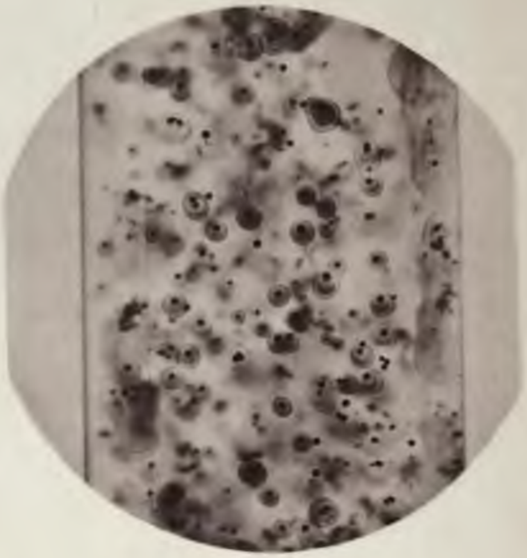

Fig. 2.

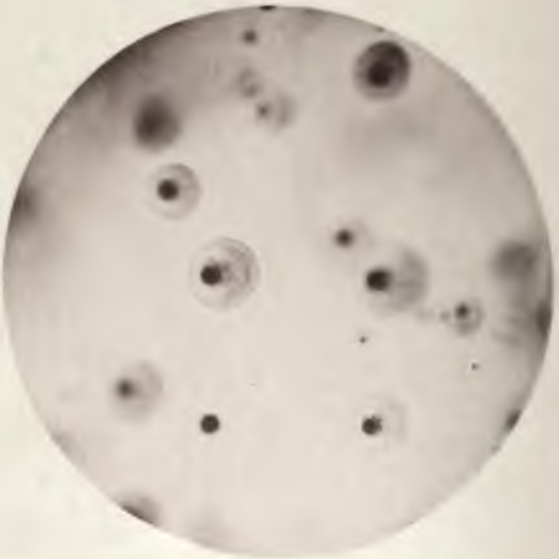

Fig. 3.

BACILLUS ENTERITIDIS SPOROGENES.

PLATE II.

FIG. 2.

Culture in *sugar gelatine* of spores of bacillus enteritidis from a source different from that whence the germinating spores in Fig. No. 1 were derived : liquefying colonies, after incubation for 48 hours at 20° C.

[Magnifying power, 3½.]

FIG. 3.

From a portion of same culture as is exhibited in Fig. 2, but more highly magnified.

[Magnifying power, 12].

BACILLUS ENTERITIDIS SPOROGENES.

PLATE III.

FIG. 4.

Colonies of bacillus enteritidis in *formate agar plates*, after anaërobic incubation for 24 hours at 37° C.

[Magnifying power, 8.]

FIG 5.

A colony from the culture depicted in the previous figure, more highly magnified.

[Magnifying power, 12.]

FIG. 6.

Typical virulent *milk cultures* of bacillus enteritidis sporogenes, after incubation anaërobically at 37° C., for 24 hours.

[Natural size.]

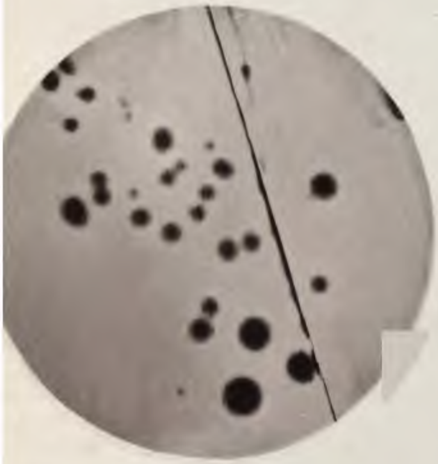

Fig. 4.

Fig. 5.

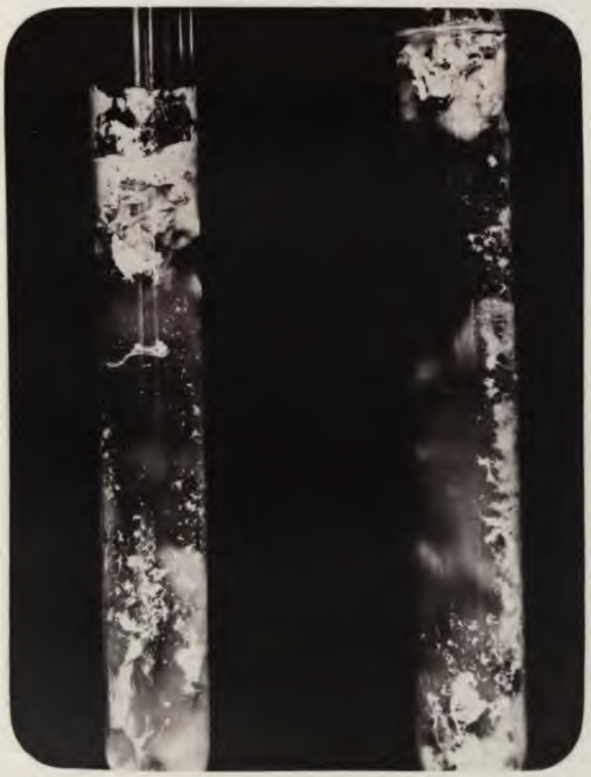

Fig. 6.

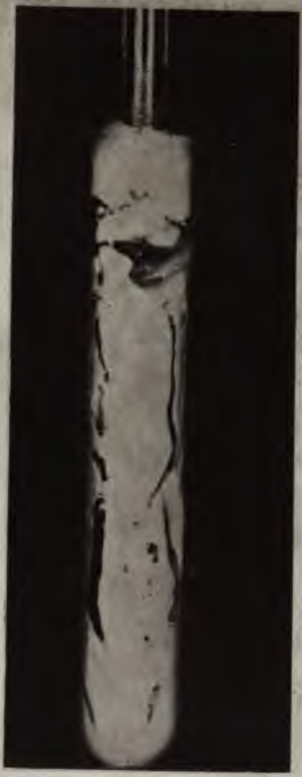

Fig. 7.

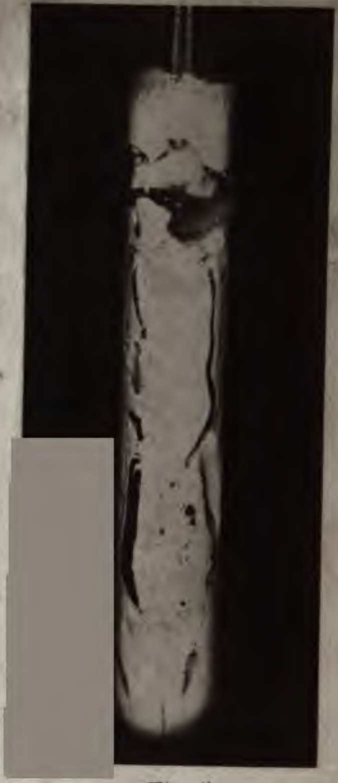

Fig. 8.

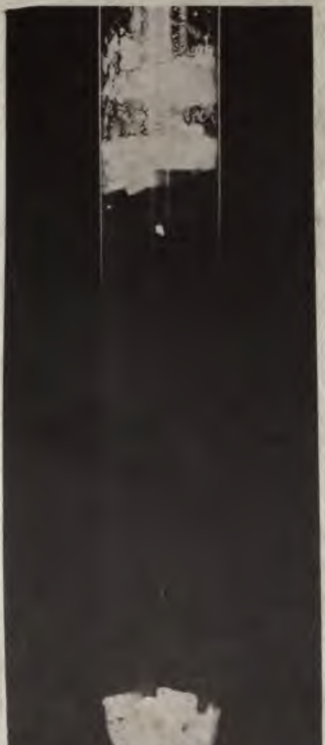

Fig. 9.

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